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T: Holt White.

Keys's Practical Bee-Master: 1780.

The Femin' Monarchi' by Charles Butler: 1634.

S.T.C. 4194

Sam: Johnson, in his Grammar prefixed to his Dict.y, when exhibiting a specimen of Butler's peculiar mode of Orthography, remarks that he was "a Man who did not "want an understanding which "might have qualified him for "better employment." —

Practical Bee-Maſter:

IN WHICH WILL BE SHEWN

HOW TO MANAGE BEES

EITHER IN STRAW HIVES OR IN BOXES,
WITHOUT DESTROYING THEM,

AND WITH MORE EASE, SAFETY, AND PROFIT, THAN
BY ANY METHOD HITHERTO MADE PUBLIC, VIZ.

I. To manage Bees in Straw Hives, with new constructed Tops, at a ſmall expence, as profitably and eaſily as with Boxes.

II. In Boxes of an improved and *cheap* Conſtruction, eaſily to be managed, and with ſo little Disturbance to the Bees, that all the neceſſary operations may be performed without any Danger.

III. To catch and ſecure the Queen, or to fix her and a Swarm to any place you pleaſe.

IV. To cauſe Bees to quit a Hive, and to be ſo tractable as to ſuffer themſelves to be handled without Stinging.

V. Several Methods of Swarming Bees *Artificially*.

VI. To cauſe a Swarm to work in ſeparated Glaſſes, without any Hive; or in globular or other glaſſes, ſo that pure Virgin Honey may be taken when in its utmost Perfection.

VII. To prevent or cauſe Bees to ſwarm.

VIII. To take the Honey and yet preſerve the Bees, with *common Hives only*.

IX. To unite Caſts, Swarms, and Stocks.

X. A Catalogue of, and Obſervations on, the moſt proper Flowers or Paſturage for Bees.

XI. An eaſy and certain Method of preſerving Stocks in Winter and cold Springs.

XII. Several *new* and improved Methods of extracting the *Wax* from the Combs, two of them without either *Straining* or *Preſſing*; and each by a *ſingle* Operation: but more perfectly, and with far leſs Trouble and Expence of Fuel than hitherto practiced.

TOGETHER WITH SUCH FULL AND PLAIN DIRECTIONS

That the meaneſt Cottager may attain this profitable Art
Without Difficulty, and at a ſmall Expence;

INTERSPERSED WITH OCCASIONAL

STRICTURES

On Mr. THOMAS WILDMAN's Treatise on Bees:

WITH SEVERAL NEW DISCOVERIES AND IMPROVEMENTS,
THE RESULT OF LONG EXPERIENCE,

AND DEDUCED FROM ACTUAL EXPERIMENTS,

By JOHN KEYS,

BEE-MASTER.

LONDON:
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PREFACE.

THOUGH it is not the happy lot of every author to have been nurſed on claſſic ground, yet when any publications have tended more to the benefit than to the mere amuſement of the public, the candid have in general kindly thrown a veil over their imperfections in ſtyle and manner. The writer of the following pages, the fruits of his evening hours, as none other can be ſpared from more important avocations, thinking they may, on account of their general utility, have ſome claim to this indulgence, has preſumed to lay them before the public. He pretends not, however, to be wholly diſintereſted in this publication, but acknowledges that he has ſome regard to his own intereſt, as well as to the public good.

A natural predilection in favour of theſe uſeful and entertaining inſects, firſt introduced him to their acquaintance. But not meeting with the expected ſatisfaction from the rules and directions of the moſt generally approved authors, he was induced to make a great variety of experiments; in the courſe of which he incurred a conſiderable expence, and ſuffered much ſmart. He thought himſelf, however, amply repaid by their reſult, which was entirely to his own ſatisfaction, and highly worthy, if vanity and ſelf-love do not deceive him, of general notice; whether his diſcoveries be really fit to be encouraged, or conſigned to oblivion, he now ſubmits to the judgment of the impartially ſkilful.

As every circumſtance either unneceſſary in real practice, or impracticable in itſelf, except a few which are ſelected for their novelty, is omitted; a greater ſcope is allowed for the deſcriptions, which are particularly minute on the account of novices; who would otherwiſe meet with many and even inſuperable difficulties.

A great number of prevailing, though deſtructive, errors are here pointed out, and many new improvements and diſcoveries ſubſtituted.

The beſt methods of conducting the various operations are ſo particularly and plainly deſcribed, as to render the practice familiar and eaſy to farmers and cottagers in general: for want of which, works of this kind have hitherto rather diſcouraged than promoted a general keeping of Bees.

The author hopes, however, that this treatiſe will enable the country people to overcome the moſt formidable obſtacles, viz. the little profit and often great decreaſe, or even the total loſs of their Stocks, in the uſual modes of practice; or the too great expence, loſs of time, and ſmart, attendant upon moſt of the improved ones yet offered to the public: to which may be added the danger, inſufficiency, and uncertainty of them all.

The inquiſitive mind will alſo meet with ſome things worthy of attention. Particular inſtructions will be given how to manage boxes and glaſſes of various figures, and in different arrangements, as well for entertainment as emolument. As to what is merely ſpeculative on the nature of Bees, it being totally incompatible with the Author's practical plan, he refers the curious to *The Natural Hiſtory of Bees*,* where they will meet with a very pleaſing and accurate account.

It would be entirely labour loſt, ſhould this method, through over refinement, be not adapted to the general uſe of the peaſantry of Great Britain and Ireland. It is from them, and them alone, that any conſiderable national increaſe of honey and wax is to be looked for: but as very few of this great multitude have any tolerable knowledge of conducting the many neceſſary operations of Bees, this branch of rural œconomy is greatly neglected. Bees, with

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* *Publiſhed by Knapton and Vaillant*, 1744.

with proper management, are capable of multiplying prodigiouſly; and it may be aſſerted, without any exaggeration, that there might be five thouſand times more honey and wax produced than there is at preſent, were every farmer and cottager to keep a reaſonable number of Stocks; for then all the honey and wax that the vegetables of theſe kingdoms are capable of ſupplying, would be as regularly collected by theſe induſtrious inſects, as the corn from the fields, or the fruits from the trees; and thereby prevent the neceſſity theſe realms are now under, of importing great quantities of theſe very uſeful articles from foreign countries, very much to the national loſs.

It is readily acknowledged, that there is more trouble and more expence attending the method here propoſed, than the old one of ſuffocation; but, if the profits be trebled, or even doubled, a perſon muſt pay very little regard to his own intereſt, who ſhould prefer the old and leaſt advantageous method. What advantages would attend the keeping of poultry and pigs, if a very conſiderable portion of care and expence were not beſtowed upon them?

Though Bees, with little comparative trouble and expence, afford great profits, yet it is much to be apprehended that there will be no conſiderable increaſe of theſe beneficial inſects, unleſs the patriotic and benevolent gentry in every county will make a point of ſetting an example, and directing a portion of their accuſtomed liberality to this purpoſe. Ruſtics are, of all people, the laſt in adopting any *new* practices, though the *old* be ever ſo evidently abſurd. No reaſoning, however clear and ſtrong, is able to conquer either their obſtinacy or their prejudices. It is only by examples of ſuperior gain that they can be rouſed to deviate from their uſual track, and induced to follow any practice they have once either neglected or deſpiſed.

The moſt probable method of attaining this certainly deſireable object, would be to preſent a Swarm of Bees and a couple of new conſtructed ſtraw hives to poor cottagers of good characters; at the ſame time binding them, by an abſolute, promiſe to manage them according to the directions, or book, of their kind donors. This, though at firſt of ſmall value, would in time prove not only of great public utility, but would alſo be ſo very beneficial to the poor families themſelves, as, by the increaſe and produce, to afford raiment to the naked, food to the hungry, and make the humble habitations of many, who are now miſerable through extreme poverty, comfortable and joyous: while the benign hearts of their humane benefactors would feel ſuch tranſports of happineſs and ſatisfaction, on contemplating the change, as would amply recompence them for the little charge and trouble it might require.

There is, it muſt be acknowledged, ſome riſque that theſe laudable intentions may be fruſtrated, and the propoſed advantages not gained, unleſs the ſame benevolence which firſt gave the hives, would alſo condeſcend from time to time, and by caſual viſits, to inſpect their management, and obſerve whether the directions given be conformed to. Even this, perhaps, may be inſufficient for the intended purpoſe, ſhould any of theſe laborious inſect communities be conſigned to the lazy or the ſottiſh: but, Heaven forbid, that the ſweet profits of the temperate and induſtrious Bees ſhould be ſquandered abroad in riot and exceſs, while the diſtreſſed wife and children are pineing at home with want, or periſhing by the piercing ſeverity of the winter's cold!

Great, very great, are the charitable benefactions of the inhabitants of theſe kingdoms! but equally great are the inſolence and profligacy of the lower claſs of people! But, to throw out a hint, might not theſe very benefactions be made ſubſervient to a general reformation, by beſtowing them on none but the ſober, the induſtrious, and the well-behaved? Would not this conduct, if general, excite a ſpirit of emulation among the poor to excel in virtue: as well knowing, that without this recommendation, they would certainly be deprived of all hopes of protection and encouragement?

couragement? Here it is to be lamented, that the moſt vicious are likewiſe the moſt puſhing, and by their impudence can obtrude themſelves into notice; while the virtuous, too meek perhaps, and ſubmiſſive, are intimidated from aſking, and muſt therefore be ſought out. Thus patient merit ſtarves, while the miſcreant riots on what would have made a whole virtuous family grateful, comfortable, and happy! The Author's ſituation in life has afforded him ample opportunities for theſe obſervations, which thoſe in higher ſtations are neceſſarily deprived of; he therefore hopes this digreſſion will be thought not altogether impertinent.

After all, perhaps, the only method of eſtabliſhing a proper mode of managing Bees, ſo as to become univerſal and permanent, would be for ſome perſon in every neighbourhood to make himſelf perfect in the art: he might then ſuperintend and manage his neighbours Bees at a moderate ſtipulated price for each Stock, through the year; in a ſimilar manner to thoſe who go from houſe to houſe to brew, &c. Many, who through age and infirmities are rendered unfit for hard labour, might eaſily acquire and practiſe this art to their own benefit, and that of the public.

Some, who already keep Bees, may object that the Author has inſerted many well known particulars: ſuch ſhould conſider that he writes for the totally ignorant, as well as for thoſe who have ſome previous knowledge; that he means to inſtruct in the whole art, and not in a part only. But, ſhould the objector ſave only one hive of Bees by the methods here pointed out, though taught by a ſingle Paragraph, there ſurely can be no cauſe of complaint; as the ſaving will be much more than the whole purchaſe of the book.

Should this treatiſe merit a ſecond edition, any uſeful practical information or corrections ſhall be properly inſerted; it being the Writer's ardent wiſh that this beneficial art be brought as near perfection as poſſible. Such communications addreſſed to the Author, will be gratefully acknowledged.

The Writer hopes that the critics will be tender of this his only child; the child of his old age; which, though now weak, ſickly, and helpleſs, he flatters himſelf, may, by a little of their kind aſſiſtance, become extenſively uſeful.

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THE

THE

PRACTICAL

BEE-MASTER.

CHAPTER I.

Of the NATURE *and* QUALITIES *of the* QUEEN BEE.

1. TO have a competent knowledge of the proper management of BEES, it is firſt of all neceſſary to be well acquainted with their nature and qualities: For it muſt ſurely be deemed abſurd in any one to attempt to govern a people, without knowing any thing of their manners, cuſtoms, and propenſities.

2. Each Stock of Bees, and alſo each Swarm, is compoſed of three ſorts, or claſſes, *viz.* the Queen, (fig. 1.) the Drones, (fig. 2.) and the Working Bees, (fig. 3.)

3. The Queen is the *Common Mother* (in the ſtricteſt ſenſe of the word) of the whole

Stock. Several modern authors however have not only dignified her with this title, but have alſo attributed to her a regal power and polity, ſimilar to *that* known among our ſpecies. Such flights of fancy may be allowed to poets, but of the natural hiſtorian it is required to delineate with truth and accuracy, and without any exaggeration.

Though I have myſelf paid very great attention to this point, yet I could never obſerve any ſuch inſtances of ſovereignty; nor am I ſingular in *this* opinion, having Monſieur Reaumur to countenance me; for he obſerves, " *If* ſhe reigns it is over " ſubjects that every moment know the " good of their ſociety demands what they " perform; and who therefore never fail " to do it. From this ſource flows their " unparalleled attachment, tenderneſs, and " reſpect. They never have occaſion to " receive orders. Both Queen and People " invariably purſue the deſigns of Nature."

4. Notwithſtanding the great names of Locke and Hoadly, female government ſeems to have been the *firſt* among men; for we find Eve governed Adam, and made him do a very foul thing. So among Bees, the *Matriarchal*, was alſo the *firſt*, and is the *only* one that has been admitted among them from the beginning: However as cuſtom has dignified the Parent Bee with the title of Queen, we ſhall diſtinguiſh her by that appellation through the ſucceeding pages.

5. Her importance among Bees is much greater than that of the greateſt monarch among the ſons of men. Without *Her* the whole ſtock or family, would be ſoon extinguiſhed. Should a natural or accidental death deprive any Stock of their Queen, confuſion, ſorrow, and neglect inevitably ſucceed. They then barely work for immediate ſubſiſtence, and for a very ſhort time; for having no proſpect of a future race, they pine and languiſh until famine and death put a period to their grief.

6. With reſpect to figure, the Queen, (fig. 1.) is longer and more ſlender than the Drones; the hinder part tapering almoſt to a point; her belly and legs are yellower than thoſe of the common Bees; the upper part of her body is of a much darker colour, nearly approaching to a gloſſy black; as is alſo the tapering part beyond her wings, which is divided into four joints, diſtinguiſhed by as many circles, whereas the common Bees have but three circles, and thoſe of a lighter colour; and the nearer ſhe is to the ſeaſon of depoſiting her eggs, the more ſhining and large ſhe appears. Her wings are very ſhort in proportion to her body, hardly reaching beyond the middle, and ending about the third ring, whereas thoſe of the common Bees and Drones cover their whole body: ſo that upon the whole ſhe ſeems rather clumſy, and is not unlike a tall woman with a very ſhort cloak; but in her deportment, ſhe is grave, ſolemn, and calm.

7. She is armed with a ſting, which is neither ſo large nor ſo long as thoſe of the Commoners; its uſe, however, I cannot preciſely determine; as the rougheſt uſage, even to preſſing many of them to death in my hands, could never provoke a Queen to ſting me, though they ſeemed to dart their ſtings out for that purpoſe. But having placed two Queens together under a glaſs, I obſerved that they ſtabbed each other, until death ended the combat.

8. Perhaps this unwillingneſs in the Queen to ſting on any other occaſion, may be owing to her conſciouſneſs, that on her preſervation, depends the happineſs and proſperity of her numerous offspring. For of her fruitfulneſs one may ſay, "that her progeny "is like the ſand upon the ſea ſhore." To bring forth young is the whole of her duty, and this important office her children know to be abſolutely neceſſary to their mutual proſperity, and is the meaſure of that affectionate ſolicitude they bear her. To this ſingle circumſtance may all thoſe ſhining qualities of royalty be reduced.

9. It might ſeem too fabulous to relate, had not that great and indefatigable Naturaliſt, Monſ. Reaumur, aſcertained the fact by accurate examination, that a ſingle Queen, in the courſe of ſeven weeks, can produce ten or twelve thouſand young; and that ſhe commonly brings forth from thirty to forty thouſand in nine months. Some, however, are more prolific than others.

10. This is further confirmed by another very eminent Naturaliſt, Swammerdam. He diſcovered in the body of a Queen Bee ready to lay, an ovarium, or egg bag, containing five thouſand one hundred viſible eggs: And if ſo, there can be no difficulty in ſuppoſing her capable of producing ſo numerous an offspring in ſo ſhort a time.

11. About the middle of the ſpring is the height of her laying: from many circumſtances it is very probable that ſhe then lays about two hundred eggs a day. However prodigious this may ſeem to thoſe not converſant with natural hiſtory, ſeveral animals ſurpaſs the Queen Bee in fecundity.

12. But this ſurprize will be greatly heightened by reflecting upon a faculty ſtill more wonderful, that of appearing to be endowed with a power of keeping in her body eggs that have been impregnated ſeveral months before; or, (which amounts to the ſame) the ſeed of the male, capable of vivifying the eggs at the time of their excluſion. For, though the Drones, who are the males, are ſeldom ſuffered to remain in the hives (581) longer than the middle of Auguſt, yet the Queen ſtill continues to lay eggs and produce young, not only in Autumn, but alſo in the next Spring, until March or April, and in great abundance, all by virtue of the Autumnal impregnation. Nor is this faculty confined to the Queen Bee, as Waſps, Hornets, and ſome other inſect tribes do the ſame.

13. That the Drones have any agency at all in propagation, has been elaborately diſputed by the Rev. Mr. Thorly; * nor does he ſeem to think them of any other uſe whatever; as though Providence had made a *diſtinction* without deſigning it to anſwer any particular purpoſe.

14. Butler, however, who wrote long before, viz. in 1623, † differs widely from him in ſentiment, and ſeems to be not only the *firſt* diſcoverer of their ſex, but alſo of that of the Queen. He has maintained his opinion with greater weight of argument, which later experience has fully confirmed.

15. Notwithſtanding the prying eyes of ſo many philoſophers and naturaliſts in every age, the myſteries of love remained an impenetrable ſecret until the ſuperior inquiſitive genius of Reaumur lifted up the veil and uſhered them into day. To obtain this diſcovery, he confined a Queen and a Drone in a glaſs, and there had his moſt ſanguine wiſhes compleatly ſatisfied by being an eye witneſs of the nuptial conſummation. His joy, however, at this fortunate diſcovery was not without ſome alloy, in beholding ſeveral ſingle Drones, he had accommodated her Majeſty with, die at her feet, through exceſs of amorous toil. From this circumſtance it fully appears, that a ſmall number of males are wholly inſufficient

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* Enquiry into the Nature, &c. of Bees, 1765.

† Female Monarchy.

ſufficient for the arduous taſk; and that a large number, generally ſeven or eight hundred, are required to impregnate the many thouſand eggs depoſited by the Queen.

16. But as Thorley has degraded the Drones from their office, and has repreſented them as unprofitable and uſeleſs, ſo have we an antagoniſt againſt the Queen, in Mr. Daniel Wildman, (nephew to the famous Mr. Thomas Wildman) who, in his ſmall pamphlet,* has attempted to render her equally inſignificant.

17. He aſſerts, that the opinion of the Queen being the general parent of the whole Stock, "is abſolutely without foundation." He further ſays, "They (the common "Bees) couple together, I make no doubt, "though privily, and apart by themſelves, "though they never were obſerved, yet they "certainly apply themſelves to that buſineſs "ſecretly within the hives, or elſe abroad "where there can be no witneſſes."

18. In anſwer to this, it may ſurely be urged, that as among ſo many millions of Bees, which many people poſſeſs, and among ſo many watchful eyes of naturaliſts and others, no ſuch conjunction has ever been noticed, either in glaſs hives, or when the Bees have been abroad, it is by no means unreaſonable or unwarrantable to aſſert, that it is highly improbable any ſuch connections

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* Complete Guide for the Management of Bees, 1775.

ever take place. We know that all other inſects have no regard to what we call modeſty or decency among us; therefore ſuch delicacy in Bees, and in Bees alone, is ſuperlatively aſtoniſhing.

19. To this it may perhaps be replied, that neither has the engendering of the Queen and Drones, ever been diſcovered in glaſs or other hives; I grant it. The caſe, however, is by no means parallel. Here is a ſingle inſect amongſt a vaſt multitude, by whom ſhe is conſtantly ſurrounded; whoſe reſidence likewiſe is always in the centre of the hive, and conſequntly her perſon continually veiled from human eyes, except when ſhe is depoſiting eggs near the extremities of the combs.

Reaumur relates, that he kept Bees in glaſs hives many years, but could never obtain a view of the amours of the Queen and Drones. I have placed a Swarm in ſeven glaſſes, each holding three pints, and having a common communication with each other at bottom; yet, notwithſtanding the Bees were thus divided, the Queen was ſeen but twice the whole ſeaſon; much leſs could any obſervations be made of a royal wedding.

20. But there is another inſuperable objection to Mr. Daniel Wildman's principle: For although no one ever ſaw them engender, ſome *one* muſt have ſeen them depoſit their eggs. But who ever ſaw a working Bee with its *Tail* in a cell? With their *Heads* they are continually ſeen ſo, in order to depoſit

their loads; and whether alive or dead, are always ſound with their heads towards the bottoms of the cells. Therefore Mr. Wildman muſt grant that they lay their eggs at their mouths. I have ſeveral times held Queens in my hand who, while there, have laid their eggs, and in the ſame way as all other creatures do. Working Bees I frequently hold in my hand; and they alſo have depoſited, but never eggs, unleſs excrement may be ſo called.

21. Mr. Wildman endeavours to ſupport his doctrine by that beſt of all proofs, experiment. But it is neither one nor two, but a long ſeries of ſimilar reſults, that amount to a certainty. He declares he often repeated ſome particular experiments to determine the point; and gives us an account of one, in which, after taking out the Bees from a hive, he ſeparated from them the old Queen*, and a young one, not yet come to maturity; this laſt he ſtuck up in another hive, with a ſufficient quantity of Bees with it, and obſerved at the ſame time that there were no young Bees in the other common cells. At the end of three or four days he took the Bees out again, and obſerved *young Bees* in every cell.

22. This experiment, however, appears to me on ſeveral accounts a very doubtful one; for he could by no means be certain there

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* Although he calls his Treatiſe complete, the ſecret *how*, he reſerves to himſelf.

were no young in the common cells, unleſs he had taken out and examined each comb ſeparately. But even allowing that there were no young in the cells before, yet how is it poſſible there could be *young Bees* at the end of three or four days? For it is an inconteſtable fact, that the egg itſelf is three days in that ſtate, and five or ſix more under the appearance of a maggot. Mr. Wildman muſt therefore moſt certainly be miſtaken in this; as he is alſo when he affirms that a Royal Bee is five or ſix weeks hatching.

23. But Mr. Wildman proceeds ſtill further, and obſerves that there were not only young Bees in the old combs, but alſo in new combs, which the Bees had built in the courſe of four days. The young Queen moſt probably, was not in a ſufficient ſtate of maturity to breed theſe; but it does not follow that ſome other young Queen, who had eluded his ſearch, did not. I have myſelf been frequently diſappointed in ſearching for the Queen, and have been obliged to repeat the operation two or three times before I could find her. Theſe experiments therefore, cannot by any means be deemed deciſive, eſpecially when attended with ſo many improbabilities. It would have been more ſatisfactory had this gentleman acquainted us with the number of combs and Bees put into the hive, and at what ſeaſon.

We hope he will favour us with ſome future experiments on this ſubject, made with preciſion, and in the preſence of intelligent perſons.

24. In the mean time, to ſtrengthen the arguments already offered in ſupport of our opinion, let us add the teſtimony of Swammerdam and Reaumur. Theſe gentlemen beheld in the ovarium of a Queen Bee, five thouſand three hundred eggs at one time. Now, ſuppoſing there had only been half that number, what can ſuch a multitude be deſigned for, if, as Mr. Wildman aſſerts, the Queen only produces three or four young? Beſides, there never have been found any veſtiges of an *ovarium* in common Bees; therefore, as Mr. Wildman admits that by diſſection of a drone the ſex may be aſcertained, this argument muſt be allowed to be full as applicable and concluſive when applied to the Queen and the common Bees.

25. Although he does not admit of the Queen being the common mother, yet in ſeveral pages he acknowledges, "That without a young Queen there can be no Swarm. "That a hive ſhall be well ſtocked with "honey and Bees, and yet all ſhall die in "the winter, occaſioned by the loſs of the "Queen; for when this happens they will "neither work nor eat." I ſhall make no comments upon this, as it coincides with the general received opinion as to the abſolute neceſſity of a Queen to the proſperity of every Stock or Swarm. Though from him we cannot learn from whence that neceſſity can poſſibly ariſe.

26. I have lately met with another ſingular ſentiment of a foreigner reſpecting the royal brood, as related to a friend of mine, viz. that by taking any common egg, and fixing it in a royal cell, it will become a young Queen ; and this (as he ſuppoſes) from the extraordinary ſupply of food.

That nature ſhould endow a multitude of creatures with ſuch a peculiar conſtruction of veſſels, as can be uſeful only to a few in many millions, is as repugnant to obſervation and experience, as it is to probability. The Drones are much larger and of a different conformation to the Queen and Commons. Can this ariſe purely from any peculiarity in the nutriment? The reſult of ſuch an experiment would more likely be a drone, a heavy clumſy inſect, with an obtuſe anus, than a Queen, whoſe body is no thicker than that of a common Bee, but which extends much longer and terminates in a point. We might as well expect that our hens would all produce cock eggs by giving them a double portion of food.

27. That the gentleman might have taken a common egg and placed it in a royal cell, and that a young Queen had been afterwards produced, I will not diſpute. For there might be a Queen already in the hive unperceived by him, who might lay a royal egg in that cell, the working Bees having firſt taken away the common egg. Beſide, why ſhould a Queen be capable of furniſhing ſeveral ſupernumerary princeſſes, when

in caſe of miſcarriage, the commoners could ſo eaſily ſupply the deficiency? And doubtleſs theſe would have been furniſhed with that inſtinct or knowledge, had it been ſo.

28. Let this be as it will; in practice it can be of no conſequence or uſe; as he acknowledged that a common egg muſt be depoſited *in a royal cell.* To do this the Bees muſt be drove, and ſome combs cut out; in doing which a real royal egg may be deſtroyed, and the reſt of the young injured. The operation itſelf is likewiſe troubleſome. All which inconveniences may eaſily be avoided, by ſetting the *Queenleſs* Stock at night over ſome other. (382.)

29. Having thus attempted to eſtabliſh the principles we ſet out with, we proceed next to treat of the generation of Bees. And, firſt, the Royal Nurſery. This is compoſed of cells or neſts (fig. 4, *a*, *b*.) which are of a circular form, of a conſiderable thickneſs, and in appearance rather clumſy; for one of theſe cells weighs as much as a hundred of the common; the royal cell, when about half made, reſembles the lower part of an acorn turned upſide down; (fig. 4 *a*.) but it is gradually lengthened in proportion to the growth of the incloſed embryo, until at laſt it is ſealed or covered over at the top with wax (fig. 4. *b*). Sometimes theſe cells hang from the middle of a comb; but oftener from the ſides, ends, or edges of the combs (fig. 4). They hang in a perpendicular direction, with the *open end* point-

ing down towards the floor. The number of theſe cells are various, from two or three to ten or twelve. After the royal brood is out, they are generally taken to pieces, and the wax applied to other uſes. But if the wax be not wanted, they are permitted to remain.

30. A young Queen is capable of being fecundated four or five days after her birth; but until ſhe *is*, no Swarm will riſe with her; and that ſometimes does not happen for ſome weeks, for want of Drones. Her colour changes to a deeper hue, in proportion to her age; and the nearer ſhe is to her laying-time, the more ſhining and large ſhe appears.

31. A Swarm has generally the ſagacity to ſingle out the forwardeſt to lead them. Tho' it frequently happens, that ſome bold virago will intrude, and hazard her life for an empire. But when ſettled in a hive, ſhe that is ready to lay will be enthroned, and her competitor expelled or ſlain.

32. The Queen begins to lay in February or ſooner, if the weather proves mild, and proper flowers are in bloſſom (512) and will in ſome ſituations, continue laying until October. I have taken Stocks often at that time with brood in them. But at what time ſoever the Bees carry in little balls upon their legs, it may be looked upon as a ſure indication of the Queen's breeding.

33. As moſt of the inſect tribes exhibit transformations, which might be accounted

miraculous, were they not ſo common, ſo the Bees undergo ſimilar and equally ſurprizing changes, which we ſhall now endeavour to deſcribe.

The Queen firſt lays an egg, at the bottom of thoſe holes, or waxen cells, which form the combs (fig. 4); after the egg has remained in this ſtate about three days, it becomes a *maggot*; which lies in the bottom of the cell rolled up in the form of a half moon, and is ſurrounded with a clammy ſubſtance. The Bees continually feed it at the mouth during five or ſix days. The embryo being then conſiderably increaſed in bulk, the cell is cloſed or ſealed over with a covering of wax by the common Bees; having been thus left about twelve days more, the young Bee breaks through this waxen covering, and appears in its perfect form. But a royal egg is longer in hatching than a common one.

34. There is alſo, and generally in the middle of every hive, a comb appropriated for the Drone brood, the cells being much deeper than the common ones: and when the young are ſealed up, inſtead of a *flat*, they have a convex cover, which is a little oval.

35. The duration of a Queen's life, as alſo of the inferior Bees, ſeem to be about a year. The Queen therefore that breeds *early* in one ſpring, can hardly be the ſame that breeds thro' the next and the ſucceeding ſummer; I the rather think ſo, becauſe at times I

have had Stocks die or dwindle away; for which no other reaſon could be aſſigned, but the death of the Queen; none being found upon examination in the hive, though there was plenty of honey. This may, perhaps, explain why ſometimes in the ſpring Bees deſert a plentiful hive; the Queen being dead before any royal eggs were depoſited.

CHAPTER II.

A DESCRIPTION *of the* DRONES *and* COMMON BEES.

36. THE common Bees (fig. 3). being ſo well known, need no other deſcription than that they are of no ſex, being neither male nor female. Theſe are generally, and indeed truly and emphatically called the *Working Bees*.

37. The Drones, (fig. 2.) as we have before obſerved, are the males: they are both larger and longer than the common Bees, but ſhaped nearly like them. They are *without* ſtings; inſtead of which, their tail end contains the diſtinguiſhing characteriſtic of their ſex: and which mere preſſure will force

ſorce out of their body. They have no fangs, and are more tender than the Workers. Eight or ten hundred of theſe are found in a good Stock, whoſe *ſole* deſignation is the ſervice of the Queen.

37. The tongue of the Drones being ſhorter than that of the workers, diſables them from ſucking honey from the flowers, and therefore they are obliged to be ſuſtained by the honey laid up in the hives. Except paying their court to the Queen, they do no work; neither do they ſtir out of the hive until the ſun has warmed the air, and invites them by it's ſplendor. The ſweets of love, a plentiful and delicious table, and a ſhort life, but free from care, from ſickneſs, and from anxiety, is their happy lot. Conſidered *only* in this point of view, who would not wiſh to be a Drone?

38. Some have thought, that the bodily heat of the Drones, is neceſſary in hatching the brood: but I could never obſerve them in the leaſt attentive to that point. Beſides, it is well known that great numbers of Bees are bred early in the ſpring, long before any Drones are hatched, and when the air is much colder than when theſe appear; as alſo long after they are expelled the hives.

39. Several authors are alſo miſtaken in affirming that the brood is wholly depoſited in the center of the combs. Numbers of my Stocks have yearly extended their breeding cells quite to the edges of the

combs,

combs, and cloſe to the windows of the boxes, without ſuffering any prejudice.——Thorly agrees with me in this obſervation.

40. I particularly notice this, becauſe it has been a point of conſequence in the conſtruction and arrangement of boxes; and thereby has occaſioned more trouble and expence than otherwiſe would have been neceſſary; but as the principle has no ſolid foundation; a peculiar conſtruction of boxes for *that purpoſe* muſt be needleſs. The truth is, the Bees breed in our climate rather too faſt than too ſlow. And they often die in backward ſprings by having a great number of young mouths to feed from too ſcanty a larder.

41. The age of a Bee, conſidered ſingly, ſeems to be that of a year; although a Stock, if the combs did not become too foul, might exiſt for centuries, that is, *by ſucceſſion*; juſt as the human race do in populous cities; while ſome are hourly taken off by age, accident, or infirmities, others are riſing into life and manhood, to repair theſe unavoidable, and even neceſſary breaches of mortality.

42. Young Bees may be diſtinguiſhed from the old by their being of a lighter brown colour. Old Bees are more red or dark. The wings of the young are intire; but thoſe of the old ſhagged and torn by their unremitted labours. A Bee juſt hatched has a great belly, ſtuffed out with the ſuſtenance it took whilſt a maggot. By theſe marks

may be diſtinguiſhed in a ſwarm the old, the young, and the middle aged.

43. Bees have a quick and an extenſive ſmell, either of honey, or honey dews; but are not diſguſted with ſmells that are diſagreeable to us, if not within their hives. In the ſpring they are often ſeen ſipping in drains, and places wetted with urine. Tar they are fond of, and if in their reach will injure their honey with it.

44. By their acute faculty of ſmelling (or perhaps by a ſenſe of which we can have no idea) they diſtinguiſh the Bees of their own hive from any others; and know from the ſmell the death of any of their companions cruſhed or killed about the hive, and will purſue the murderer with unrelenting vengeance.

45. They ſtop up with a kind of gum-reſin, called *propolis,* all the holes or crevices of their hives. Therefore the fewer there are of ſuch in the hives, the more it will eaſe them, and prevent a loſs of time and labour which might be employed more to our profit.

46. They foreknow impending ſtorms, at ſuch times crouding to their hives ſo thick that the door-ways cannot admit them faſt enough. They work day and night in the hive, taking repoſe by turns; hanging upon each other by their claws between the combs. They alſo have ſigns by which they communicate their wants or deſires to each other.

47. They are the moſt cleanly of all creatures (except a Dutch woman) ſuffering no dirt, filth, or any other offenſive thing in their hives. Their own neceſſary diſcharges are performed as they fly, and never in their hive, unleſs compelled thereto by an injudicious cloſing up of their hives, which generally occaſions their death.

48. They are very fierce, and prone to revenge, when provoked; as they will be by ſtrangers ſtanding too near the entrance of their hives, or when any buſtle is made near them. Their irritability proceeds from a ſuppoſition of ſome injury being deſigned againſt their ſtate; for otherwiſe they are not apt to ſting. When at a diſtance from their hive, you may beat them from flower to flower, and moleſt them while in their induſtrious purſuits; they will then bear it with exemplary patience, nor ſhew the leaſt reſentment, no not even ſhould you catch them in your hand, provided you do not preſs them.

49. They ſoon become acquainted with a perſon who frequents their hives, and ſeems attentive to pleaſe them by his calm and deliberate deportment. They readily will diſtinguiſh him from any other perſon. So far from offering him any inſult, they will often light upon him as a mark of their affection. He may even lay his hand at the mouths of their hives, and they will paſs over it without the leaſt reſentment. But ſhould this ſame perſon in any manner diſ-

turb the hive, inſtantly friendſhip and harmony are deſtroyed, the pride of their little hearts riſes, and they are filled with anger and revenge.

50. Moſt creatures grow tame to the hand that feeds them; not ſo the bees, if in doing of it, their hive be in the leaſt diſturbed: for no creatures are ſo fond of peace and quietneſs.

51. Not that they will bear malice long with the perſon they have been once familiar with, for in two or three days they will forget the greateſt injury he can have done them, and be as cordial with him as ever; but not ſo with caſual viſitors, by whom, if once affronted, it is a great chance, but that come near them whenever they will, attempts will be made to give them the moſt exquiſite pain, by ſtinging their eyes or noſe. As the ſtinging of Bees is ſometimes attended with fatal conſequences to men and beaſt, it will by no means be improper to make a diſtinct Chapter of ſo very important a ſubject.

CHAPTER III.

Of the STINGING *of* BEES.

AS the Bees, though a diminutive people, are armed with weapons which, though ſmall, are ſo venomous as often to ſtrike men of gigantic might with terror, it is highly proper to conſider, before we attempt any familiarity with them, how to defend ourſelves from them; and to know when wounded, how to apply a proper remedy.

53. Many perſons through an unreaſonable dread, cannot ſuffer a Bee to come near them, without being flurried; and in this ſtate of confuſion and terror provoke theſe otherwiſe inoffenſive inſects to ſting them, by ſtriking at them. This treatment always raiſes their reſentment; which when thus excited, generally continues for ſeveral days; and while it laſts, the Bees will purſue the offender from one end of a garden to the other.

54. The beſt way, where they come buzzing about you, is to wave your hand gently before your face, and make a low retreat; or ſtooping down, to thruſt your head among herbs, ſhrubs, or the like; this will be a ſufficient ſecurity 'till their anger is abated,

and they have retired from you. This behaviour will conciliate a more peaceable demeanor towards you another time; and a repetition of it will procure you their friendſhip.

55. Not but there are ſome perſons againſt whom Bees will have an invincible antipathy, however calmly and inoffenſively they may have always behaved to them. Inſtances of this ſort have very frequently fallen under my obſervation. Neither has a change of colour in their clothes in the leaſt diminiſhed their rancour, but they would ſtill follow them in every part of the garden from day to day. Whether this diſlike proceeds from ſomething diſagreeable in the countenance, or in the effluvia of the body, is hard to determine. But it is very clear that ſuch perſons muſt never think of becoming Apiators*, or managers of Bees. Nor indeed any other perſon who cannot command his temper while employed about them.

56. The Bees are uſed to a mild parental government, to peace, and quietneſs; and like ſome of the heroes of antiquity, will never ſubmit to tyranny or violence, but will reſiſt unto death.

57. In windy or other diſagreeable weather, which diſcompoſes them, or hinders

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* The adoption of this appellation I hope will be excuſed, as we have no ſingle word expreſſive of the meaning.

their labours, they become very fretful and quarrelſome; at ſuch times, whoever loiters about their hives will be ſure to ſmart for their temerity. So likewiſe in very hot days, and when there is plenty of honey gathering, their eagerneſs is ſo great, that ſtanding before their hives as it obſtructs their paſſage to and fro, will be deemed an affront.

58. Hair and feathers are diſagreeable to Bees. But fuſtian, velvet, and leather, are deſtructive. For from ſuch ſubſtances, they cannot withdraw their ſtings, but, together with them, leave part of their bowels, and thus ſoon die. On the contrary, from linen and woollen apparel, they readily diſengage their ſtings, and without receiving any harm. The degree of the inflammation produced by the ſtinging of a Bee, varies in a double proportion to that peculiarity found in different conſtitutions, and to the quantity of venom injected. In ſome people the ſlighteſt ſcratch, or ſmalleſt puncture, ſhall prove highly painful, and be difficultly cured; while in others much deeper wounds ſhall preſently heal without any inconvenience. So in ſome the ſtinging of a Bee will immediately occaſion a very painful tumour over great part of the body; in others it will be attended with very little pain, and but a ſmall ſwelling, both which ſoon ſubſide; except the wound be made in a very ſenſible part, as the eyes. To me their ſtinging is of trifling conſequence; I had rather be ſtung by ten Bees on my hands, than

once by a ſtinging nettle. Beſides, the Bees are not at all times equally vigorous, ſo that in proportion to the heat of the weather, and the degree of their anger, a larger or ſmaller portion of venom will be injected. Nor can a Bee ſting more than three times; as its venom will then be quite exhauſted.

59. When a Bee has ſtung any one, it is beſt to have patience, and permit it to withdraw its ſting, which otherwiſe will be left behind, and the wound be thereby made larger. One method of cure is, to preſs with ſome force the hollow end of a key over the wound; this operates by forcing out the venom, and preventing its being conveyed by the abſorbent veſſels into the circulation. Another method is, with the flap of a woollen coat, or piece of woollen cloth with the knap on, to rub the wound briſkly backwards and forwards, in the ſame direction as the veins, now and then wetting the wound with a little ſpittle, to prevent the fretting of the ſkin, and to continue the friction until there be a ceſſation of the ſmarting. Or it will be much better perhaps, to rub the wound with the woollen cloth only one way, viz. downwards on the arms, legs, and trunk of the body; but upwards on the face, neck, and breaſt; by this means the venom will be more thoroughly preſſed out and abſorbed by the cloth; and its entrance into the abſorbent ſyſtem more effectually prevented.

60. But if the wound be not immediately rubbed, this method will be uſeleſs, as

the poiſon will have penetrated too far. In this caſe recourſe muſt be had to ſome penetrating remedy. Among a multitude of herbs, oils, chemical preparations, &c. that have been tried, the following compoſitions have been found the moſt efficacious, from my own perſonal experience, as well as that of many others.

Take of common linſeed oil two parts,
vinegar of ſquils one part,
honey one part;

theſe are to be well ſhaken together. The more ſpeedily this is applied, the more ſalutary it will prove. Rub it hard in and about the wound with your finger, as long as any ſmart is felt; and at times afterwards, if any ſwelling or inflammation remains, this compoſition will not wholly prevent a tumour, but it will greatly leſſen it and alleviate the pain.

61. But in general, ſweet ſpirit of vitriol, rubbed well in, will more effectually prevent any pain or ſwelling; and may be applied to the moſt ſenſible parts, even to the eyes, with ſafety. But in proportion to the ſtrength of the inſect, the quantity of venom injected, the lapſe of time before the remedy is applied, and the irritability of the habit, will be the quantity of ſpirit neceſſary to a cure. It is not the rubbing a little on will effect it, but as long as any ſwelling riſes, or any pain is felt, ſo long muſt the embrocation be continued; and even

after an intermiſſion, if either ſhould return, the remedy muſt again be had recourſe to.

62. There have been too many melancholy inſtances of perſons, as well as cattle, that have been ſtung to death by Bees. Perhaps the following directions may in future, at leaſt in ſome caſes, prevent ſo fatal an accident.

When a perſon is ſuddenly beſet by theſe inſects, that have been by any means enraged, if any houſe, ſtable, or the like be near, he ſhould run and ſhut himſelf up in the darkeſt part of it, and with his handkerchief bruſh off as many of the Bees as he can. But if they be very numerous, and any other perſon within call, water ſhould be poured over him to waſh them off, as bruſhing will cauſe ſome of them to ſting. Where no aſſiſtant is nigh, after having been ſhut up a little while, and having bruſhed off all he could, he ſhould run away as ſwiftly as poſſible to get out of their ſight, and immediately afterwards apply ſome of the above remedies; or, for want of them, any kind of ſweet oil, or freſh greaſe, that can be firſt obtained, ſhould be rubbed upon the wounds, until a better remedy can be procured.

63. Where no buildings are nigh, he ſhould hide his head, and his whole body, if it can be done, in a hedge, or among buſhes, or the like. If none of theſe be nigh enough to ſave him, plunging into a pond of water will preſently free him from them. Or for want of that the throwing

up of water briſkly with his hands ſo as to fall over himſelf and the Bees, will induce them to retreat, thinking it a ſhower of rain. But if no water be near at hand, the throwing up of duſt may perhaps have the ſame effect.

64. When only a few Bees have ſettled on any perſon, let him cover his head and neck as well and as cloſe as poſſible with his clothes; and if theſe be thick enough to prevent the ſtings from penetrating, the Bees may ſoon be driven away by throwing duſt or water over them. Care, however, muſt be taken to keep this covering ſo cloſe by one hand, or any other faſtening, that none of the inſects may be able to inſinuate themſelves under it. If the head and neck be well ſecured, ſuch wounds as may be elſewhere inflicted cannot be fatal; neither can a few ſtings received in the face, before it could be covered. And ſuch Bees as may have previouſly ſettled on the head and face, can eaſily and preſently be cruſhed to death by preſſing the covering againſt them. If there be nothing elſe within reach, the face muſt be covered with both hands, ſecuring the eyes, noſe, and mouth in particular.

65. Whenever any one is very much ſtung, he ſhould be put to bed as ſoon as poſſible. And beſides being bathed as before directed, he ſhould drink plentifully of baum tea, water-gruel, or other thin cooling and laxative drink, in which the juice of currants, apples, oranges, &c. may be ſqueezed. He ſhould eat but little of any thing, and no animal food. If there be much inflammation,

flammation, and the patient be feveriſh, blood ſhould be taken away as ſoon as poſſible; and ſuch other medicines be exhibited as a ſkilful medical gentleman may think neceſſary.

66. When a perſon has the misfortune to be ſtung in the throat, while medical aſſiſtance is fetching, with all poſſible ſpeed, ſome mild oil ſhould be gradually ſwallowed, or for want of this melted freſh butter, or even greaſe, if nothing elſe is to be had; for not a moment muſt be loſt. As ſoon as the medicine compoſed of ſweet oil, vinegar of ſquils, and honey, can be prepared,* the the patient muſt ſwallow ſome of it gradually. Where vinegar of ſquils cannot ſpeedily be procured, good common vinegar may ſupply its place.

67. But it muſt carefully be obſerved, that the cautions and directions already given are *not* to extend to ſwarms of Bees, that peaceably and without any provocation leave their hives of their own accord, and ſettle upon any one. For then, if the eyes, noſe, and mouth be ſecured with the hands or a handkerchief, they will alight on him without doing the leaſt prejudice, provided he remains intirely paſſive and ſtill, until they have all ſettled. He may then gently walk with them, until a hive can be obtained, which being rubbed on the inſide, at the *top only*, with a mixture of ſugar and ale,

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* This I have known ſucceed; but the ſweet ſpirit of vitriol I have not yet had any opportunity of trying, tho' a tea-ſpoonful or two may be taken in a little water.

and held over him as near as poſſible, where the Bees are moſt numerous, the greater part will ſoon aſcend; he ſhould then walk to ſome diſtance from the hive, and thoſe Bees that yet remain upon him, miſſing their companions, will ſoon quit their ſtation to join them, unleſs the Queen ſhould happen to remain behind; in this caſe, the Bees muſt be taken off with a ſpoon (384) and put into the hive.

68. But if inſtead of obſerving this peaceable behaviour, he ſhould be flurried, and miſtaking or ſlighting their intended friendſhip, ſhould ſtrike at, or endeavour to beat them off, they will revenge the affront ſo as to endanger his life.

69. It is very probable that cattle on ſuch occaſions, may be excited to reſentment; and although in ſetling on them they do not ſting, yet their crawling may give the creatures ſome uneaſy ſenſation and cauſe them to be very teſty, and by endeavouring to bruſh them off, excite the Bees to ſting them. In this caſe, or any other, where cattle are accidentally beſet with Bees, or Waſps, &c. they ſhould be driven with the greateſt expedition to ſome pond, where they may, if poſſible, be covered with water, and the parts that are not ſo, muſt have plenty of water thrown on them, to waſh off as many Bees as poſſible, at the ſame time briſkly throwing up water among ſuch Bees as continue the attack. As ſoon as the inraged inſects are retreated, bruſh off with wet twigs thoſe Bees

that remain on the animals. When there is no water at hand drive them into a hedge, or which is ſtill better into a ſtable.

70. If an animal be very much ſtung, bathe the parts affected with any oil or greaſe that can be ſooneſt got, that the poiſon may have leſs time to ſpread; whatever is uſed ſhould be well and long rubbed in, and repeated very often until the inflammation ſubſides. And if the remedies before mentioned be uſed, the cure will be more certain and ſpeedy. Bleeding is proper if the inflammation be great, or the creature appears to be in great torture or convulſions.

71. A drink ſhould be given him, of thin oatmeal gruel, in which two ounces of ſalt petre have been diſſolved: this ſhould be repeated at three or four hours diſtance; it will contribute to diminiſh the inflammation and alleviate the pain.

72. As it is impoſſible but thoſe that manage Bees muſt ſometimes be ſtung, and that ſeverely too, unleſs they have ſome proper defence; and as ſuch a ſafeguard may be provided at a ſmall expence, no Apiator ought in good policy to be without one.

73. The ſafeguard conſiſts of a hood made of ſuch thin open cloth as milk is uſually ſtrained through; any other thin light cloth will do well enough. Head armour compoſed of this kind of materials will not be very burthenſome, and is ſufficiently cool. It muſt be big enough to go over a man's hat, and round the neck, ſo as to tie before, with a

ſtring running through a tape or loop holes. That part of it which is oppoſite the face muſt be cut out, and a piece of very open gauze, cat-gut, or what is much better and ſtronger a caul of which barbers make the inſide of their wigs, muſt be ſewed therein. Crape or muſlin will too much obſtruct the ſight, when kept at the proper diſtance, which muſt be ſo great that no Bee can reach the face with its ſting. The hat muſt have narrow brims about two inches wide, and unſtrung.

Great care muſt be taken in uſing this hood; that it be drawn round the neck ſo tight that no Bee can paſs underneath it, and that the part below the neck extends as far as the coat. If there be the leaſt opening left ſufficient for the Bees to get under, they will find it out, and before it can be looſened prove worſe tormentors than if there had been no defence at all. Therefore let the ſtring be tied with a bow knot, ſo that if there be occaſion, it may be inſtantly untied and thrown off.

74. A pair of tanned, or other thick leather gloves will be a ſufficient defence for the hands; but theſe muſt be long enough to cover the ſleeves of the coat, ſo that no Bee can get up the arms. To which let us add, thick yarn ſtockings over another common pair. A man thus armed is able to encounter the greateſt army the Bees can bring againſt him. If women intermeddle with Bees, it will be proper to defend their

necks and boſoms, by putting on a man's coat, together with the head dreſs.

75. As this armour is of trifling expence, and will laſt a life, no perſon who keeps Bees ought to be without it. With this defence he may turn up their hives, examine, aſſiſt, and move them upon any occaſion, or at any time, without the leaſt ſmart or the leaſt danger. Or ſhould Waſps or Bees beſet any cattle, with this armour, he may ſafely go among them, and deſtroy them.

76. But a ſmall apparatus will do, for any buſineſs about the Bees, that does not much diſturb them. This may be made of a ſmall hoop, wide enough to extend round the face, and three quarters of an inch deep, with a piece of woollen cloth ſpread over it, and tacked to its edges, ſo as to let about an inch of the cloth hang over. A piece of the front muſt be cut out, and ſome net-work ſewed in as before directed for the hood; a narrow piece will do, placed directly oppoſite the eyes. A bead, or ſome ſuch contrivance, ſhould be ſewed oppoſite the mouth part to hold by, in manner of a maſk.

77. This will ſufficiently defend the face, but eſpecially the eyes. For ſingle Bees, when they are angry, generally aim at them, and at that time, will ſting no where elſe. Perſons accuſtomed to the language of Bees, know what tones they uſe when they are determined to ſting. The war-whoop is then ſounded, that every one may ſtand upon the

defence. It is much eaſier to prevent an evil than to cure it.

78. Among poor cottagers, who keep Bees, one or two of theſe ſafe-guards or armour in a village or neighbourhood will be ſufficient for the whole, by lending them to each other.

CHAPTER IV.

Of the APIARY, *or Place to keep Bees in.*

79. THE next object of conſideration to a perſon intending to keep Bees, is a proper ſituation for his Apiary. The ſituation of it, whether yard or garden, ſhould be as open as poſſible to the ſouth; that the fronts of the hives may have as much of the ſun as poſſible. But if the hives cannot be ſet full ſouth, ſouth-weſt is more eligible than ſouth-eaſt; and this laſt is better than north or eaſt. From repeated obſervations it has been found, that the more ſun the Bees have the more vigorous they are, and that they work with the greater ardour.

80. Let them be placed ſo near the dwelling houſe as to be in view of the

room moſt occupied. Any diſturbance or accident, will then be the more readily perceived. Neither will there be a conſtant neceſſity to employ a perſon on purpoſe to watch the riſing of the Swarms, but only as occaſion may require. Beſides theſe advantages, the Bees will be familiarized to the ſight of the family, and thereby become more tame and tractable.

81. The Apiary ſhould be defended from the northern and eaſtern winds, either by buildings, walls, or by cloſe and high hedges; theſe winds are prejudicial to the Bees in many reſpects. The beſt hedge for this purpoſe is the quick or white thorn, permitted to grow high, after being firſt plaſhed and intermixed with female lime trees, as the flowers of theſe as well as of the quick furniſh ſubſiſtence for the Bees. It muſt alſo be ſo ſtrongly fenced round that no cattle or poultry can approach the Stocks. The firſt, by throwing them down, will endanger their own lives, and occaſion the loſs of the Stocks. And the dung of the others, and their rooſting upon the hives will prove ſo diſguſting to the Bees, as to make them ſometimes relinquiſh their hives; but at beſt they will not thrive ſo well.

82. Neither muſt they ſtand under the dripping or ſhade of trees eſpecially of yews, elders, or laurels. Nor ſhould any weeds or filthineſs be ſuffered near the hives, as harbouring numberleſs vermin, and other enemies to theſe induſtrious and cleanly in-

ſects. An Apiary ſhould not be near rivers, ponds, or large tubs of water, as many of the Bees will be blown therein and drowned.

83. The quantity of ground to be allotted for the Apiary, muſt be in proportion to the number of Stocks intended to be kept. Houſes will be neceſſary if boxes are to be uſed. But theſe are too expenſive for general uſe, or where numerous Stocks are to be kept: ſtraw hives therefore in theſe caſes, are preferable, being much cheaper, as they will anſwer the purpoſe as well, and require neither cot nor houſe.

84. From long experience, it is ſtrongly recommended to ſet the Stocks at ſome diſtance apart, and upon ſeparate ſtands. By this precaution much quarreling, and ſometimes ſlaughter, will be prevented, as they will be leſs liable to miſtake their habitations on any critical occaſion, which may oblige them to return from the fields with great precipitation.

Another advantage ariſing from this diſpoſition is, that by being ſeparate they are not near ſo quarrelſome with each other, or with the Apiator. And not only this; but he can alſo go more ſafely and conveniently *behind* them, for which there is often an abſolute neceſſity, without giving or receiving any offence.

85. But though the hives are to be placed ſeparate from each other, it is by no means meant, that ſome ſhould be in one ſpot of ground and ſome in another. No; they

muſt be altogether in one view, that in the ſwarming ſeaſon, the Bee-herd, or perſon who watches them, may readily diſtinguiſh any Swarm that ſhall ariſe, otherwiſe ſome will be inevitably loſt.

86. The country people generally place their Bee Stocks in cots or little hovels, upon ſhelves one above another, and againſt walls or pales, without any opening behind. So that the getting at them is like ſtorming a lion's den. And to add to the abſurdity, the ſhelves are ſo near to each other, that a hive cannot be raiſed, be the neceſſity ever ſo great. Theſe cots are likewiſe an inticing ſhelter for numberleſs vermin, who imperceptibly plunder and deſtroy the Stocks; and the fault is laid to witchcraft, bad luck, and other myſtical cauſes (241.). Another great fault is the ſuffering rank weeds to grow about the ſtands; and being ſo negligent as not to keep the floor and ſtands clean bruſhed.

87. The form of the ſtands for ſtraw hives ſhould be triangular (fig. 12.). Let three ſtrong ſtakes of ſound wood, of about two feet in length, be drove into the ground, conformable to that figure, ſo that from the outſide of each ſtake there be fourteen inches diſtance, and the ſtakes are to ſtand ſixteen inches above the ground. The tops of the ſtakes muſt be on a level with each other, or rather the front ſtakes ſhould be half an inch lower, ſo that when the hive is ſet on, the dripping of rain may paſs freely off, and

not run into the entrance of the hive. Flat pieces of wood are to be nailed acroſs the top of the ſtakes, ſo that the floors of the hives may ſtand firm; but the floors are not to be nailed on, for reaſons hereafter given, (490). Were the ſtands made higher, the hives would be more liable to be injured by high winds, or in caſe of being thrown down by accident, of receiving greater damage by the fall; and not only ſo, but at this heighth they are more conveniently managed.

88. The ſtands ought to be five feet, but at leaſt four, every way from each other, and ſet in regular or uniform rows; where the ground will conveniently admit of it, ſeven or eight feet diſtance between each hive will be ſtill more eligible; but when placed at a ſmaller diſtance than four feet, there is no poſſibility of going among the rows to handle the hives without affronting the Bees of thoſe behind; and they are a people of too great conſequence to be unneceſſarily affronted.

89. Some gentlemen may, perhaps, diſapprove of ſtraw hives in their gardens, as being unſightly; but, if the triangular ſupporters be made handſome, and the hives themſelves be concealed by a wooden caſe, or only front and ſides formed of painted pannels, or by any other ſmart and pleaſing contrivance, that objection will be obviated. And if the ſtands be placed at any conſiderable diſtance from the walks, there will never be any danger of the Bees ſtinging the company, provided they

do not incautiouſly approach too near the hives. Or a hedge may ſoon be formed round the Apiary, of ſyringoes, ſo as to intercept the view. But this hedge muſt be placed at ſuch a diſtance from the front of the hives as not to keep the ſun from them.

90. The bottoms of floors for the hives (fig. 6.) ſhould be of well ſeaſoned yellow deal, at leaſt an inch thick, but an inch and an half will bear the weather better, and is not ſo liable to warp. The ſhape of the floor is to be round, or at leaſt a ſquare with the corners rounded off; its diameter fourteen inches. Where boards of a due width cannot be readily procured, two pieces glued, tenanted, or rabbited together, may ſuffice. But to all floors two ſlips of wood muſt be nailed underneath, to prevent the wood from caſting: this precaution muſt not be neglected, it being of much conſequence towards the preſervation of the Bees. And therefore, ſhould any crevices, ſeams, or fiſſures afterwards appear, they muſt be timely ſtopped up with putty or ſome other cement.

91. The upper parts of the floors muſt be planed ſmooth and even, ſo that when the hive is ſet on there may be no vacancy between the edge and the floor. But if the floor be planed a little ſhelving, or level, within half an inch of the edge, it will prevent the water from ſtanding or running under the edges of the hive.

92. A ſmall ſlip of wood, about five inches long and two broad, (fig. 8.) will be

required as an alighting-board for the Bees to pitch on when they return from the fields. It may be ſufficiently faſtened on by means of two pegs of wood, or pieces of thick wire, driven into its edge, and then fixed in the proper correſponding holes made in the front edge of the floor; the joining will not be ſo cloſe as to prevent the rain from dropping between, and will thereby ſecure the board from any ſettled moiſture that may prejudice the Bees. If the alighting-board be made out of the ſolid wood of the floor, many inches muſt neceſſarily and needleſsly be cut to waſte; whereas any ſmall piece of refuſe wood of the above dimenſions will in fact do better, and be a conſiderable ſaving in a number of hives.

93. As threatening ſtorms frequently precipitate the return of the Bees ſo much as to occaſion their miſtaking their own hives, and thereby bring on quarrels and battles, it will be worth while, in order to prevent this, to paint each alighting-board of different colours, by which the hives will be more eaſily diſtinguiſhed from each other by the Bees before they pitch. And the paint will prove both preſervative and ornamental.

CHAPTER V.

Of the BEE-HOUSE.

94. THOSE who are deſirous of ſatisfying the laudable curioſity of minutely obſerving the operations of theſe wonderful inſects, muſt be provided with proper boxes; as ſuch indeed are indiſpenſably neceſſary for *this* purpoſe. A *houſe* alſo will be equally uſeful to preſerve both boxes and Bees from the *extremes* of the different ſeaſons.

95. A houſe capable of containing *four* Stocks, will be fully ſufficient to gratify the moſt inquiſitive mind in every thing relative to Bees. For real utility, ſtraw hives of a proper conſtruction, which anſwer the purpoſe full as well, and require no houſe, are alſo much cheaper, and may be as eaſily and *full* as profitably managed, as boxes of any kind whatever.

96. Directions for the conſtruction of a houſe to contain four Stocks in the ſtory method: The front to face the ſouth. The length eight feet four inches. Height in front five feet. Behind five feet ſix inches. Breadth one foot two inches. Floor, two feet from the ground. Three ſtiles, each four inches wide, and long enough to extend from the roof to the bottom.

Four doors, each one foot ten inches in width, and of the ſame length as the ſtiles, to which they are to be hung by hinges, one door to the right hand ſtile, and another to the left, in manner of folding doors, ſhutting in a rabbet.

Openings or paſſages for the Bees, are to be cut out of the front, beginning at ſix inches diſtance from each ſtile, and are to be in length four inches, and one inch and a half high from the floor. Theſe are intended to correſpond with the like openings in the boxes. There are to be ſimilar door-ways ten inches and a half in height from the floor. But this height ſuppoſes the bars of the boxes three quarters of an inch thick, and the looſe floors of the boxes the ſame.

97. The boxes are deſigned to ſtand within ſix inches of each end; and between every two boxes, is to be a vacancy of ſixteen inches; but betwixt the boxes that ſtand on each ſide of the middle ſtile, there will be only eight inches. The boxes are twelve inches wide; ſo that there will be two boxes, and a ſpace between them of ſixteen inches, oppoſite each pair of folding doors. If a houſe is to be made for a larger number of boxes, the ſame model and proportions are to be obſerved throughout.

98. The floor is to be laid one foot ten inches diſtant from the ground. It ſhould be upon a level, that the boxes may ſtand firm, but the boards need not be planed,

if looſe bottoms be uſed to the hives, as I have recommended (90.) otherwiſe the houſe floor muſt be made very ſmooth, and no joinings or ſeams, unleſs ſtrongly glewed or cemented in thoſe parts where the boxes are to ſtand. The floors ſhould be well ſupported by very ſtrong rails; as ſometimes the weight will be very conſiderable.

99. The four corner poſts ſhould be ſtrong and of good ſound wood (oak will be beſt) and well fixed in the ground.

100. The front muſt be boarded quite cloſe: but it muſt be particularly obſerved that within ſide it muſt be quite even and fluſh from end to end. Feather-edge boarding therefore in this part, cannot be admitted, but the boards ſhould be rabbeted into each other, to prevent ſtorms of rain or ſnow from driving thro' the joinings. The reaſon for having the front inſide perfectly even, is becauſe the boxes are to ſtand ſo *cloſe* againſt it, that a Bee cannot paſs between the box and the front, and thereby get into the houſe, and alſo becauſe it is neceſſary theſe boxes ſhould ſometimes be moved to the right or left, as well as at other times one upon another.

101. The roof may be covered with feather-edged boards, or any other materials that will keep out the wet. The dropping of which is intended to be in the front, and where it will be no inconvenience to the Bees, if the roof be made ſo as to project two inches beyond the face of the houſe;

but if the dropping be on the back, it will be very inconvenient to the Apiator in many of his operations behind. The two ends are to be intirely cloſed with boards. And alighting-boards are to be fixed in the front to every paſſage or door-way, exactly in the ſame manner as directed for the ſtraw hives (92.).

102. The houſe ſhould be well painted; for this will not only be ornamental, but, by preſerving the wood-work, be a conſiderable ſaving in the end. Different colours ſhould alſo be painted over the ſeveral paſſages; which will be a very good index to the Bees, and keep them from miſtaking their reſpective habitations. It will likewiſe be very uſeful to paint the number of every Stock over the door-way.

103. How greatly ſoever, *I* may think the ſtory method preferable, there may be perſons of a different opinion, and who may therefore chooſe the collateral method; viz. that in which the boxes are placed ſide by ſide. To meet therefore their wiſhes, we have thought proper to give the following deſcription; and hope it will be acceptable.

104. A collateral houſe of four Stocks, muſt be in length ſix feet. Height in the fore front ſix feet; back front ſix feet ſix inches; breadth one foot two inches. Three ſtiles, each four inches wide.

Two doors; one to each pair of boxes, and each door two feet ſix inches wide.

The houſe to have two floors.

Bottom floor, two feet high from the ground.

Upper floor, two feet above that.

105. The door-ways or paſſages are to begin ſeven inches from each ſtile; each paſſage to be four inches in length and one inch and an half high. But as each pair of boxes are to ſtand cloſe together, or ſide by ſide, the door-ways of each pair of boxes will be nearer together than in the ſtory-houſe; and ſimilar paſſages are to be made for the upper floor; for two Stocks are intended to ſtand on the bottom, and two on the upper floor.

106. No doubt there will be a deſire of ſetting glaſſes on the tops of theſe boxes in a ſimilar manner to thoſe of the ſtory method. For this reaſon it is, that a foot in height is left in each ſtory above the boxes for that purpoſe. But if there be no intention of uſing glaſſes, the houſes may be made 16 inches lower.

107. Let it be obſerved, that this houſe, and that before deſcribed, are formed upon a ſcale adapted to the ſize of my boxes. But where larger boxes are intended, the houſe muſt be made in proportion to the ſize. Gentlemen of fortune may have theſe houſes built in a very handſome manner, and ornamented according to their own taſte; but great care muſt be taken not to alter or depart from the ſcale of dimenſions.

108. The ſpaces left between each pair of boxes are for their more commodious

removal, eſpecially for the ſtory boxes; for when theſe are to be raiſed or ſeparated, unleſs there be a ſufficient vacancy to ſet a ſpare box between, the Stock muſt be removed out of the houſe upon a ſtool, and then put in again, which prolongs the operation needleſsly, and renders it more troubleſome to the Apiator as well as to the Bees. However, ſuch as may think ſixteen inches between every other pair of boxes, a needleſs and too expenſive a lengthening of the houſe, may ſo contract the ſcale or plan, as to leave only ſix inches between each; ſo much room is abſolutely neceſſary to put the arms between the boxes whenever they are to be lifted up or ſhifted.

CHAPTER VI.

Of BEE-BOXES, *or* BOX-HIVES.

109. WE now proceed to the conſtruction of the boxes, (fig. 7.) which, from a great variety of frequently repeated experiments, I have found in every reſpect to be the moſt ſimple in their contrivance, the moſt eaſy to manage, the moſt profitable in their produce, and the moſt

moderate in price of any hitherto offered to the public attention; at the ſame time they are equal, if not ſuperior, to any others, for the amuſement and improvement of the inquiſitive.

110. Theſe are to be made of well ſeaſoned yellow deal, or any other thoroughly ſeaſoned wood, that which is the leaſt apt to warp or ſplit, and has likewiſe the feweſt knots, is the beſt for the purpoſe. Each board muſt be at leaſt three quarters of an inch thick after having been well planed. Thinner boards will not keep the Bees warm enough in the winter, and will therefore endanger their lives.

111. They are to be in the inſide full nine inches high, and eleven ſquare, from ſide to ſide. Therefore allowance muſt be made in the height to receive three bars of wood, (fig. 7.) of the ſame thickneſs as that of the box; theſe bars are to extend from the front to the back; the middle bar, (fig. 9.) is to be three inches and a half wide, and the right and left bars only three inches. Theſe bars are to be let into the top, ſo as to have four intervals, or openings, *a*, *a*, *a*, *a*, of half an inch between each bar, as well as between the two ſides of the box.

112. There muſt be parallel grooves in the edges of every bar, and in the two ſides of the box; theſe grooves muſt be one-ſixteenth of an inch deep, and one-twelfth of an inch wide, in which iron ſliders are propoſed to run. To admit which, in the back

of the box, the ends of the bars are to be *let in* fluſh with the grooves, while the upper ends are to be *rabbeted*, ſo as to be even with the upper part of the grooves; a thin fillet (*a*. fig. 9.) is then braided upon the rabbets, which by this management will form four ſlits or openings, (fig. *b*, *b*, *b*, *b*,) of the ſame depth as the grooves, and in width three quarters of an inch, in order to receive four ſliders, (fig. 10.) nearly of thoſe dimenſions.

113. But it muſt be *noted* that the bars are *not* to be nailed down to the box, they being intended to be moveable at pleaſure. The *greateſt exactneſs* is required in their dimenſions and conſtruction, or the whole of their deſign will be rendered uſeleſs, and thereby bring the ſcheme into diſcredit, though the fault will in reality be in the bungling carpenter. Few among the country carpenters (eſpecially journeymen) have tools proper for the work.

114. For the grooves ſhould be made perfectly ſmooth within ſide, and of the exact width and depth, therefore cannot be executed by a tenant or common ſaw, and the uſual ploughing irons are too large. If the grooves are made rough or uneven, the ſliders cannot run in them with the requiſite eaſe. Or, which is equally inconvenient, if too wide or too deep, they will cauſe the ſliders to run irregularly, and tempt the Bees to fill them ſo full of wax or propolis, as to prevent the entrance of the ſliders

without great force, thereby greatly diſturbing the Bees, and running a great riſque of ſpoiling the operation. After the fillets are fitted on, they muſt be ſawed through by a very fine ſaw between each bar, ſo that the bars may be taken out *ſeparately*.

115. As the principal intention of the box-hive is to view the Bees at work, and the manner of their performing their operations, there muſt be an opening cut in the back to receive a pane of glaſs five, ſix, or ſeven inches ſquare, as may be thought convenient; but in general, it will be more eligible to have the glaſs the entire length of the back, and but two inches and a half wide; the upper edge of the glaſs to be within four inches of the top of the box. But where a more extenſive inſpection is deſired, the two ſides and the back of the box muſt be framed, (as for a ſaſh window) to receive as large panes of glaſs as poſſible, conſiſtent with the required ſtrength of the box. A greater depth is required in the upper part of the back frame than the reſt, the more ſecurely to let in the ends of the bars. There muſt be alſo three ſhutters, to ſhut cloſe over the windows, to preſerve the hive warm in winter, and to prevent the light from withdrawing the attention of the Bees from their work. Boxes with only one pane of glaſs, are alſo to have ſhutters, (fig. 7. D.) either with hinges or to ſlide in rabbets, both ways, to right or left; or two ſmall ſhutters to turn upon ſcrews in their tops, and dividing to

right and left; they ſhould meet in a rabbet, and be faſtened by a button at bottom.

116. In the front edges of the boxes, an opening or door-way muſt be cut out, four inches long, and three-eighths of an inch deep This *depth* is fully ſufficient for the paſſage of the Bees, and if made deeper or higher, becomes capable of admitting mice and other vermin, to the great prejudice of the Bees.

117. Beſides the bars to which the Bees will faſten their combs, a top or cover muſt be provided of the ſame thickneſs as the box, to extend about half an inch over the edges, except in the front, where it muſt be exactly fluſh, becauſe the box muſt ſtand quite cloſe to the front of the houſe. The cover is to be ſcrewed down, not nailed; it would be very convenient, if the ſcrews had a ring or a head, projecting flat, that they might be taken out by the finger and thumb; but as none ſuch are kept in the ſhops of a ſize ſmall enough, and to be made on purpoſe may be thought too dear, therefore the common round-headed ſcrews, beat as flat as you can with a hammer, may be eaſily taken out or in by a pair of pliers or pincers. The ſcrews ſhould always be greaſed before they are put in, or they will ruſt; and then cannot be eaſily withdrawn.

The holes to receive the ſcrews had better be made always in the ſame places of every box, four in each cover, two in the right hand edge, and two in the left, and one inch and a half from the front and back; by theſe means, the ſcrews of the boxes will indiſcriminately ſuit each other, without breaking the edges of the boxes with freſh holes.

118. One cover ſerves for each pair of boxes, as does a moveable floor of the ſame dimenſions of the cover; one edge of which muſt be planed true, that it may come quite cloſe to the Bee-houſe. If boards of the above width cannot eaſily be procured, narrower may be rabbeted or tenanted together, and ſlips of wood let in at the ends of the floors, to prevent their caſting; but the covers may have ſlips nailed acroſs. Any crevices or chaſms left in the bottom, will harbour earwigs and other vermin, and thus occaſion, not unfrequently, the deſtruction of the Stock.

119. Another important nicety in the formation of the box-hives is, that the edges, both at top and bottom, be made ſo true, that any one box may be ſet over or under another, and no chaſm left between, to admit either an earwig or a moth, but ſtand firm and level; for they will be wanted to ſtand one upon another promiſcuouſly.

120. It has been obſerved before, that ſome perſons may prefer the collateral arrangement. Boxes for this purpoſe are to be made of the ſame dimenſions as the foregoing: They are unlike only in this, that inſtead of the bars being on the top of the box, theſe are to be on the ſide, viz. on the right hand ſide of one box, and

on the left of the other; that when the boxes are placed together, the barred ſides may tally and meet ſo exactly, that no vermin may get between, as before obſerved of the ſtory boxes. But as theſe boxes are but nine inches high, the bars muſt be made conformable to that proportion, viz. two of three inches and a quarter, and one at bottom of one inch, leaving *three* openings of communication each half an inch wide.

121. The top board is to be nailed faſt down, and muſt be the exact ſquare of the box, for it muſt have a groove on the ſame ſide as the bars, and ſimilar thereto, to receive the edge of the upper ſlider. As theſe bars are *not* to be taken out, they muſt be braded in faſt, to ſtrengthen the box. The barred ſide muſt have a cover to ſcrew on when the boxes are ſeparated. But like the ſtory boxes, one cover will be ſufficient for a pair of boxes, as it will never be neceſſary for both to be covered at the ſame time. Each box muſt have a moveable bottom, ſomething wider than the boxes, but the edges muſt be ſquare and even, that they may form a cloſe joining, and alſo may ſet quite cloſe to the front of the Bee-houſe.

122. As there are no openings in the tops of theſe collateral boxes, which might admit glaſſes, when ſuch are deſired, circular holes may be made of half an inch in diameter, *(by a centre or ſpoon bit)* in number according to the magnitude and number of the glaſſes to be ſet on. Theſe holes may

be covered, when not wanted, by buttons properly adapted to them.

(123.) Many contrivances have been formed to obviate the great inconvenience and danger attending the ſeparation of boxes in the uſual way. I ſhall juſt mention here ſome contrivances that may greatly facilitate this operation. A more perfect method will be ſhewn hereafter (605).

124. In order to prevent the Bees flying out upon the Apiator when he takes off a box, a frame (fig. 11.) may be made with bars, grooves, &c. of the ſame dimenſions, and ſimilar to the top of the box, (111, and ſeq.). But it is neceſſary to obſerve, that all the ſides of the frame muſt be of the ſame thickneſs as the edge of the box.

125. Another method is, to have a groove in each ſide of the box, and as near the bottom as conveniently can be made; and in the back a correſponding ſlit from ſide to ſide, to admit a ſheet or plate of *double* tin, which is to be ſhoved in when hives are to be ſeparated.

126. Thirdly, If the boxes are made with a three inch and a half bar in the middle of the bottoms, two ſaws, five or ſix inches broad, ſhoved in judiciouſly at the ſides of the box, will ſeparate them without receiving any conſiderable annoyance from the Bees. The front end of the bar muſt ſpread out above four inches, and be levelled down to a feather edge at the door way, to admit the Bees.

127. The firſt method may be objected to as being too expenſive. The ſecond will damage the Bees; as the ſlider cannot paſs cloſe to the under hive, and muſt cut through all the combs, which are generally extended and fixed to the under hive.

128. The third ſcheme is the moſt eligible, as there are few perſons but what either have or may readily borrow ſaws fit for the purpoſe. And any refuſe bits of wood, of the proper dimenſions, may be tacked in with little or no trouble or expence. I mean of ſuch of the common people as have any œconomy or ingenuity: as to the idle and diſſolute, it is a pity they ſhould ever have any Bees.

129. The improved method I am emulous to introduce, is by the uſe of ſliders (fig. 10.) of a peculiar conſtruction, on which the whole ſucceſs of the management depends.

130. They are to be four in number, and formed of milled iron; they ſhould be one-twelfth of an inch thick, fourteen inches long, but not *quite* half an inch wide (*c*,) except within an inch of the end (*b*,) which muſt be five-eighths wide, and terminating in a circular concave form (*a*,) the concavity of which is to be no more than one-eighth deep. The ends of the openings in the wooden tops are to be indented, conformable to that figure, to admit the ſliders ſo cloſe at the ends that no Bee can eſcape.

The ends of the ſliders are thus conſtructed, that in entering the grooves, they may cut and throw out the wax and propolis, with which the Bees generally cloſe up the grooves (as they do all crevices in their hives) as they are thruſt in, which otherwiſe would bind the ſliders and prevent their introduction, at leaſt not without great difficulty. Beſides, in order the better to facilitate their paſſage, only an inch at the ends is left wide enough to extend into the grooves; for was the whole length of the ſlider to run therein, the friction would be very conſiderably increaſed.

131. Theſe conſiderations are of importance; for by this contrivance we give the Bees ſo little diſturbance in their introduction, that a child may perform the operation without danger. Whereas, in the forcible method of prior contrivances, the Bees are greatly diſtreſſed, as well as the Apiator; nor can *many* hives be managed in a day: the uproar becoming too great, alarming, and dangerous.

132. It will be proper, and indeed neceſſary, for ſuch as have a great number of Stocks, to have eight iron ſliders; as ſuch a number will, in many caſes, prove very convenient, and greatly expedite the operations.

133. Should the hives be ſhewn to the ſmith, before he makes the ſliders, it may perhaps give him a better idea of what he is to do, eſpecially if he has any ingenuity; which indeed I have not always found to be

the caſe with theſe ſwarthy gentlemen, any more than with the carpenters.

134. If in any very fortunate ſituation my box hives ſhould be found too ſmall, they may be enlarged an inch or more in height, and an inch or more in length and width, the bars being made wider and longer in proportion. But it will not be adviſeable to increaſe the number of bars: as four openings will be fully ſufficient, while a greater number will unneceſſarily augment the trouble and expence.

135. The boxes with large panes of glaſs in the back and ſides, are chiefly deſigned to be placed in chambers and parlours, in order to be more immediately and conſtantly under the inſpection of the proprietor; for this purpoſe, a ſhelf of the due proportion is to be faſtened in the window and a proper opening cut in the edge of the ſaſh for the paſſage of the Bees to and fro. Great care muſt be taken that the door-way of the box fits cloſe to the ſaſh, or the Bees will get into the room. If there be window ſhutters, correſponding openings muſt be made in them, as ſervants will often lie in bed longer than the Bees. Theſe boxes ſhould be covered with a warm cloth in winter. They may be made of mahogany where elegance is required. If the windows be at times opened, the Bees will come in and be very troubleſome, which renders the introduction of boxes, rather inconvenient in ſuch places; ſome out-buildings will therefore be more eligible.

CHAPTER VII.

Of STRAW HIVES.

136. OF all ſuch hives as are to ſtand unſheltered by a houſe thoſe made of ſtraw are much to be preferred; as beſt defending the Bees both from exceſſive heat, and exceſſive cold.

137. Where ſtraw hives are not to be procured eaſily, ruſhes ſeem to be the beſt ſubſtitute, but they muſt be gathered when mature, and be well dried. In ſome countries wicker, or baſket hives, plaiſtered over with clay, cow dung, or the like are uſed. But theſe are neither ſo cleanly, ſo comfortable, nor ſo eaſily managed as the ſtraw hives.

138. Trunks of hollow trees, cut into the proper dimenſions, made ſmooth and clean within ſide, furniſhed with bottoms and tops properly adapted to them, and painted on the outſide, will make good and very durable hives, and are much preferable to thoſe of wicker or baſket.

139. However, as ſtraw hives are the beſt, and in general very eaſily procurable, we will confine ourſelves to them. Theſe are to be made of unthreſhed rye ſtraw, if it can be procured ſo, for threſhed ſtraw being very much broken and ſhivered, occaſions the hives

to be very rough and troubleſome to the Bees at their firſt entrance. Therefore the number of hives wanted ſhould be beſpoke before harveſt, that the maker may have an opportunity of procuring proper ſtraw for the purpoſe. Twice the number of hives to that of Stocks ſhould be in readineſs, or there will not be a ſufficiency for Swarms, and for additional hives to your old Stocks.

140. The ſizes of hives vary in different counties, containing from half a buſhel, or or leſs, to a buſhel. The moſt convenient ſize, as I have found upon many repeated trials, is that of *half a buſhel.* Perhaps this will ſuit all ſituations, except the heath countries; in thoſe, indeed, when only one hive is intended for a Stock, a buſhel will not be too big.

141. It is probable, that ſhould the dimenſions I recommend be generally adopted, the hive makers would find it their intereſt to conform to that ſtandard; and conſequently there would be no difficulty of procuring proper hives throughout the kingdom.

142. The ſtraw hives (fig. 8, *a*) according to my propoſed dimenſions, are to be clear nine inches high, and twelve inches wide on the inſide, excluſive of the ſtraw. They are to be made without tops, and quite upright, ſo as to reſemble a broad hoop.

143. The greateſt exertion of the makers ſkill will conſiſt in their being made exact to the above dimenſions, and all ſo very exactly and equally alike, that every differ-

ent hive, may be put over or under any other, and ſet cloſe and level; for which reaſon all the edges both under and upper, ſhould be made as true as poſſible, rather broader than any other part, and as flat as can be. But in one of the edges the bryer binding ſhould be left diſtant three or four inches in length, in order for the ſtraw to be cut away to form a proper door-way.

144. They are to have covers of ſtraw bound together in the ſame manner as the hives; theſe are to be quite flat, and broad enough to extend half an inch beyond the edge of the hive on which they are to ſet cloſe and even. They are to be made ſeparate from the hive, being intended to be put on and taken off at pleaſure; one cover only is requiſite to every pair of hives, viz. to twelve hives ſix covers.

145. If the hive-maker ſhould procure a hoop bent to the exact dimenſions, or width, it might prove a ſtandard to work the whole by, to the greateſt exactneſs. Should he alſo, as ſoon as a hive is made, place a ſmooth board over it, and jump thereon himſelf, eſpecially if he be a fat jolly fellow, or put a great weight thereon, it would greatly contribute to make the hive cloſe, and the edges level.

146. Theſe ſtraw hives, beſides the ſtraw covers, are to have wooden tops, which are to be formed upon the ſame idea as thoſe for the box hives, viz. they are to have four

openings, ſo as to admit four of the ſame conſtructed ſliders, as thoſe uſed for the boxes.

Theſe tops (fig. 6.) are to be round, fourteen inches in diameter, and five-eighths of an inch in thickneſs, when planed. In each there are to be four openings, *a. a. a. a.* the two innermoſt are to be eleven inches long each, and the two outermoſt ſix inches long each, and all the openings exactly half an inch wide. It is to be compoſed of three pieces of wood each three inches wide, and which we ſhall call *bars, c. c. c.* and of proper length to form the circle as above deſcribed, together with two ſmaller circular pieces, *e. e.* to fill up the whole. Theſe bars are to be joined together and the ends, *(f. f. f. f. f. f. f. f.)* by intermediate pieces of the ſame thickneſs as the bars, and wide enough to be rabbetted about a quarter of an inch into each bar, ſo that when glued in, the openings may be left preciſely half an inch wide, and of the lengths as above ſpecified. If the joining pieces are not rabbetted, as ſoon as the bars, by the heat of the ſun and of the Bees, become perfectly dry, they will ſeparate, and the whole frame become looſe and unconnected. The whole being glued together, nail a piece of board acroſs, to prevent any diſunion. But, *previous to the joining,* there is a very eſſential operation to be performed to the greateſt nicety, viz. *grooves* which are to be made in the *edges* of every bar one-ſixteenth of an inch deep, and one-twelfth of an inch wide, capable of receiving with eaſe the iron ſliders before deſcribed (130); therefore, if the grooves are not made very accurate, the whole will be rendered uſeleſs.

147. As ſoon as the glue of the work is thoroughly hardened, two ſlips of milled iron, (fig. 6.) ſomething thicker than double tin, and as wide as the bars are thick, are to be *drawn nearly round the* whole edge, as far as is dotted, and nailed firmly on.

148. This will bind the whole more firmly together than if hooped all round; but ſlits muſt be cut out oppoſite four of the openings, at one end, of a length, (fig. 6, *e. e. e. e.)* juſt ſufficient to admit the ſliders, and no wider than neceſſary; for if too wide, the Bees will have a paſſage out to annoy the Operator. By painting the edges of theſe wooden tops, they may be preſerved for ages, eſpecially if carefully kept in a dry place when not in uſe. It is not every common carpenter, however, that has either ingenuity or tools to make them with ſufficient nicety, but they may be very exactly and *eaſily* made by one that is maſter of his profeſſion..

149. It muſt be carefully noted, that when any of theſe tops are fixed on, that part which has the ſlits in the edge for the ſliders to enter, muſt be always fixed at the *back* part of the hive.

150. But a cheaper method of making them, is to nail the bars together with two ſmall ſide pieces, properly grooved in a hoop, made of the ſame depth as the bars, and ſlits afterwards ſawed out, for the entrance of the ſliders. The ends, however, of the openings in the front muſt be contracted about an inch by pieces of wood glued in, the inward parts being made rounding, the better to receive the ends of the ſliders, ſo as to come cloſe. But the ends where the ſliders enter, are only to be ſtopped up, leaving the grooves open, otherwiſe the ſliders cannot enter at all. If the ends are not thus managed, the Bees will eſcape underneath, and the cold and the vermin will have too free an admiſſion; pieces of cork glued in will anſwer the purpoſe.

151. Theſe tops as well as the preceding, when placed upon the hives, muſt have long brads, or wooden pegs, paſſed through each end of the middle bar, ſo as to penetrate about an inch into the edge of the ſtraw, in order to keep the top ſteady from ſlipping either one way or the other.

152. Thoſe who do not chooſe to have any box hives, may have a pane of glaſs fixed in the back of a ſtraw hive; this is to be done by cutting four or five rounds of ſtraw in depth, and about four or five inches in length, fixing the glaſs in at the ends of the ſtraw, and ſtopping the joinings with putty. A cover of wood muſt be placed before it.

153. Thoſe alſo who cannot well afford theſe kind of tops, need not be diſcouraged. The meaneſt cottager may eaſily make tops himſelf, unleſs he had rather idly ſleep away that time in the chimney corner, during the long winter evenings, which he might employ in ſo pleaſing and beneficial a purpoſe. For a *trifle* he may procure refuſe pieces of wood of three inches breadth, and fifteen in length; or he might with only a knife furniſh himſelf with ſuch from the branches of a tree; and with the ſame knife, reduce them to the requiſite flatneſs and ſmoothneſs, though his genius be but of the moderate degree. The ends of theſe ſticks or bars muſt extend ſufficiently over the edges of the hive, ſo as with nails or pegs, to faſten acroſs them bits of wood to hold the bar at half an inch diſtance, and two ſmall pieces at the ſides, pegged down into the edges of the ſtraw; the ends of the openings to be filled up with wood or cork, clay, or cow dung, even with the inſide of the hive.

154. This top will make a very good ſhift without grooves; and he will find in the ſequel ſeveral methods, by which he may eaſily manage with it *without* ſliders, (559, 600, 605.)

155. For want of a ſtraw covering, lay upon an even piece of ground or floor ſmall twigs (long enough to cover your hive) of oziers, willows, ruſhes, or the like; on theſe plaſter clay, cow dung, or lime and ſand; then put on another layer of twigs,

and another of clay, &c. when this is dry it will form a tolerable covering, and if made ſhelving from the middle to the edges, will throw the water off, and keep the Bees dry.

156. For thoſe who can afford it, large earthen milk or pudding pans laid over their ſtraw hives is the beſt covering that I know of. The largeſt ſort will extend ſufficiently to clear the hive-floors of the water that drops from them. Cracked ones may do if the cracks be well ſtopped with putty, clay, &c. theſe may be had very cheap. The uſual coverings among the country people are hackels made of ſtraw, gathered to a point at the top, and ſpreading down all round the hive; theſe form a tolerable covering; but unleſs well attended to, are apt, after a while, to admit the rain, and harbour mice (651.).

187. Pans are not liable to theſe inconveniences, and are more eaſily removed. Beſide which, as our hive floors are not fixed, the pans being heavy, keep the hives ſo ſteady, that no common winds will diſplace them.

CHAPTER VIII.

STRICTURES *on Mr.* WILDMAN'S *and other prior conſtructed* HIVES *and* BOXES; *ſhewing their Defects and Inconveniences, with a Compariſon between them and thoſe of my* PLAN.

158. IT is now much more than a century ſince the firſt attempt was made by the means of box hives, to manage Bees without deſtroying them. Several ingenious gentlemen, in ſucceſſion, have very laudably endeavoured to improve upon each other. Among theſe were, Meſſrs. Mew, Goddy, Wolridge, Ruſden, Warder, Thorley, White, and laſt of all, Mr. Thomas Wildman.

159. However praiſe-worthy their deſign the public at large has been but little benefited. The expence of box hives and houſes has hitherto, and is always likely, to confine this improvement to the wealthy, as they are by no means adapted to common uſe. Warder, indeed, foretold this when he wrote, and facts have verified it to this day; unleſs therefore we can introduce a ſcheme which may come within the compaſs of the farmer's and cottager's abilities and attention, we labour in vain.

160. The perfection of this art does not conſiſt merely in taking the honey and wax, without deſtroying thoſe that procured them; it extends alſo to the doing it with the leaſt poſſible diſturbance and damage to the Bees, with the greateſt eaſe and ſafety to the Operator, and with the ſimpleſt and cheapeſt apparatus.

161. It will be proper to make a few remarks upon the moſt noted of thoſe apparatus' which have already been introduced to the public.

We will begin with octagon box hives. Warder and ſome others have recommended theſe in preference to every other kind, on a ſuppoſition that as they will be warmer, ſo the Bees in the winter, and the brood in the ſpring, would thereby receive the greater benefit. But if we turn from theory to practice, it will be found (at leaſt with me it has) that the Bees and brood thrive as well in ſquare boxes as in round ſtraw-hives, which are much warmer than any box hives whatever.

162. The *ſize* of a hive indeed is of conſequence, but not ſo the ſhape. Large hives are very troubleſome to handle. In winter, alſo there will be too much vacant ſpace in them, whereby the Bees will be too much chilled. In ſummer, the Swarms will be too late; nor will they be able to fill two ſuch hives in a ſeaſon, except both that and the ſituationbe uncommonly advantageous.

163. On the contrary, ſmall hives not having ſufficient room for a great number,

the Bees are obliged to ſwarm too ſoon and in too ſmall a quantity, room being wanted for the continual encreaſe of the young. Nor are they capacious enough to hold a Stock of Bees ſufficiently large to perform the various operations requiſite in the ſpring, nor will they be ſo well preſerved from the winter's cold. For the greater the number the greater the warmth will be, provided the hives be well filled; for on this alone the great benefit depends, and not on the *ſhape* of the box. Much leſs does it depend upon the nature of the wood of which the box is made; for it is of no real conſequence whether it be of deal, mahogany, or cedar. The Bees are not fanciful enough to ſtand upon ſuch niceties. Let any gentleman keep two good Stocks of Bees, one in a deal box, and the other in a hive made of any other materials, and he will be convinced that this theory is without any foundation.

164. Prior to Mr. T. Wildman there has been no conſiderable variation in the conſtruction of boxes, except in Mr. White's; for Ruſden, Warder, Thorley, and ſome others, are of the ſame ſentiment reſpecting the openings of communication; viz. to have theſe in the middle of the tops of the hives, about ſix inches long and four inches broad.

165. This conſtruction has appeared to me very injudicious; nor has Mr. T. Wildman's

narrow bars * appeared leſs ſo; as it claſhes with the generally received doctrine, *that the Queen Bee chiefly reſides in the center of the hive: There ſhe fixes her palace and throne, as being moſt ſecure,* moſt warm, and moſt ſecret, and which ſhe ſeldom quits but to depoſite her eggs, returning again immediately afterwards to her wonted privacy. If ſo her life muſt be in imminent danger at the time of driving the wooden ſlider in; for upon any diſturbance ſhe generally aſcends towards the top, and therefore may be cruſhed by the ſlider, which cannot be introduced *gently,* becauſe it will be obſtructed by the extenſion of the combs thro' the openings from the upper to the under part. Nay, even the ſeparation made by a tin ſlider, will not prevent the honey from running down among the Bees, in the very center of the box; this will likewiſe beſmear the openings, and deſtroy many of the Bees, nay, not unfrequently, the Queen herſelf; and thus occaſion the ruin of the Stock.

166. Theſe dangers, I have the vanity to think, are obviated by the nature and diſpoſition of my ſliders and tops: For the middle bar is three inches and a half wide; to this two combs will be always made, and a ſpace left between for the Queen's reſidence, over which there being no opening ſhe will be in perfect ſecurity from the ſliders, which are to run on the ſides

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* Management of Bees, 1770.

of the combs. To which may be added, that theſe ſliders can always be introduced by the *hand*; whereas the wooden ones muſt generally be forced in by a hammer or mallet, greatly diſturbing and hurting both the combs and the Bees; nor is it likely that the Apiator himſelf will eſcape quite free.

167. Another great inconvenience attending theſe middle openings is, the giving the Bees much unneceſſary labour, by making them crawl up the ſides, &c. before they can get to them, and many of them are a long while before they can find them out. In Mr. Daniel Wildman's, (nephew to Mr. Thomas Wildman) box hives the communications are near the back. The Queen indeed by this alteration is not in quite ſo much peril, but it increaſes the taſk of the Bees. For theſe inſects uſually and through choice aſcend by the front of a hive, and the neareſt combs; conſequently the way is conſiderably lengthened by their being obliged to go to the back before they can aſcend. Theſe are perhaps the principal reaſons why Bees in theſe boxes ſhew ſo great a reluctance to begin to work in an upper hive.

168. Let it alſo be conſidered, that when an empty hive is ſet under another, the Bees, heavily laden, muſt firſt crawl up its ſides to the top, and when there, muſt ſearch about ſome time before they can find the opening, and when found, it leads not to the diſtant combs, where their ſervice is now moſt

wanted,

wanted, but to the place already filled and thronged with the Queen and her numerous retinue. And not only ſo, but this diſagreeable taſk muſt, perhaps be continued ſome weeks, before they will be ready to work in a lower hive, or have made combs in its center to aſcend by. So that here is a great waſte, both of toil and time.

169. Actuated by the deſire of diſcovering a method to remedy theſe great inconveniences, and to preſerve with more eaſe and certainty the young brood, the Rev. Mr. White paid great attention to this ſubject. The reſult of his care and trouble was the ingenious and ſimple invention of collateral boxes.

Madam Vicat, a no leſs ingenious lady, of Switzerland, has endeavoured to improve upon him. And a gentleman under the ſignature of *A Lover of Bees*, in the appendix to Mr. T. Wildman's treatiſe, has propoſed an improvement upon both.

170. Undoubtedly, by having the communications in the ſides, the Queen can be in no danger, and was there no other method of obtaining this advantage but the collateral, we ſhould not heſitate to give it the preference.

But by keeping Bees both in ſtory and collateral boxes at the ſame time, I have conſtantly found that they will not ſo readily extend their works lengthways as perpendicularly. Beſides, in Mr. White's boxes the openings are not ſufficiently numerous to tempt the Bees that way. And, not only ſo, his method of ſliding a ſheet of tin, to ſeparate the boxes, irritates the Bees more, and the Apiator is in greater danger than if he had precipitately forced the boxes aſunder without it; as any one upon trial may be feelingly convinced of. Upon the whole, the operation is much more awkward and inconvenient to be performed this way than ſtory method.

171. But the grand point, which theſe ſeveral improvements ſeem to have more immediately in view, is the better nurture of the brood, which they ſuppoſe, with ſome other authors, are placed in the middle of the hive, and unleſs ſo placed will not arrive at maturity.

172. This perhaps is carrying our refinements too far. That the Queen, in general, lays moſt of her eggs, eſpecially the Drone eggs, in the center of the combs, is true. But if room be wanted, ſhe will lay them in any other parts, even cloſe to the windows, not excepting the royal cells; nor has it been obſerved that any failed the more on that account. Of the truth of this I have had yearly demonſtrations ever ſince I have kept Bees. Nay, the contrivance itſelf defeats its principal deſign, viz. the procuring a greater degree of warmth for the brood. For by adding theſe ſide boxes, the Queen is induced to lay her eggs neareſt the entrance, conſequently the brood muſt be much more ſubject to the influence of the

air than if the brood were in a box behind, or in an upper one. The truth is, we much oftener want early honey than early broods; and frequently both the old and young periſh in the ſpring for want of food, and not for want of a warm ſituation.

173. The *Lover of Bees* propoſes, that a ſuit of three boxes be placed *before* each other, inſtead of ſide by ſide. This does not ſeem to me to promiſe more ſucceſs than the others. For, in the firſt place, we cannot ſo conveniently ſee how they thrive in the middle box. Secondly, when an empty box is placed before another, the Bees muſt paſs with their loads through it, ſome weeks perhaps before they will have occaſion to build therein, or otherwiſe frequent inſpection is required, to ſee when they want an additional box, or they may want room before it be known that they have need of it; whereas in the collateral and ſtory plan, they may have admittance to either without that inconvenience. Sliders are alſo to be uſed in the ſeparation; but as we have neither been favoured with the particulars of this arrangement, nor with any account of his ſucceſs, we can ſay nothing very deciſive concerning it. This we lament, as the writer ſeems to be a judicious obſerver of Bees, and has made ſome very pertinent remarks upon Wildman.

174. But I find that all theſe, and ſeveral other methods, have been tried by a very

ingenious gentleman, who publiſhed in 1675, under the ſignature of J. W. Gent. [*], and had been then found as inadmiſſible for general practice as they have ſince.

To remedy the inconveniences of theſe methods I contrived mine, which is much leſs complicated, and much leſs expenſive; requires but little attention and trouble in the management: far leſs indeed than Madam Vicat's, whoſe Boxes cannot be ſeparated without the introduction of ſmoke; (not to ſay any thing of the expence) which renders the operation ſtill more troubleſome and offenſive to the Apiator and Bees than any of the other modes before-mentioned.

175. Mr. Thomas Wildman's boxes [†] are the next that merit our attention. And although he has diſtinguiſhed himſelf very eminently in the *Bee-walk*, and enlightened us in ſome things, yet we muſt not depend upon him as infallible.

176. His plan conſiſts of a double ſquare box, the lower one to have ſix bars acroſs, for the Bees to fix their combs on; the upper box inſtead of bars is to have two frames, and each frame to have four upright ſliders. There is a wooden ſlider to be put in between the upper and lower box, and a ſimilar ſlider at bottom. There are three windows with ſhutters to each box.

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[*] Which I ſuppoſe to be Worlidge.

[†] See his Treatiſe on the Management of Bees, p. 112.

177. A drawing is given of theſe boxes and frames, but it is too inaccurate, and his deſcription too defective, to be underſtood by common underſtandings. At leaſt, neither myſelf, nor ſeveral of my friends, to whom I have ſhewn it, were able to comprehend it. However, the purport ſeems to be, that each of theſe frames are intended to hold three combs, and when filled are to be drawn up at the top.

178. Something analogous to theſe are thoſe of his nephew Mr. Daniel Wildman *. But theſe have three frames in a box, and are to be drawn out at the back. Others I have ſeen formed with three drawers, to be pulled out like thoſe of a cheſt.

179. All theſe are very pretty contrivances in *ſpeculation*. But let me here obſerve, that when any of the frames, or diviſions, are *drawn* out, a whole regiment of Bees will *draw* upon the innovator in defence of their property (48.). The diſturbance is great, and their fury ſtill greater. But ſuppoſe the Bees can be confined in the frame until that is taken out, the expence of ſo many frames is needleſs, becauſe the box itſelf may be ſeparated, and any combs taken that are proper to be ſo, and the box afterwards returned.

Beſides, the Bees will extend their combs over the joinings of the frames, and if they do not fit very cloſe will cement them ſo firmly with propolis as to render it impracticable to draw them out at all.

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* Complete Guide, &c.

180. Neither can I agree with Mr. T. Wildman, that repeated tappings upon the glaſs will cauſe the Bees to quit a box; ſo far from it, they will flock to that place in greater numbers. But ſuppoſe the greater part do aſcend into the upper box, ſome will remain, and conſequently when the pane of glaſs is taken out, (as he directs) in order to come at the combs in the lower box, the remaining Bees will certainly revenge the theft: for no tappings upon glaſs can be ſtrong enough to intimidate the Bees like driving. Then to take the pane of glaſs out firſt, and afterwards the combs at the back, muſt be a very awkward, inconvenient, and alſo a ſlovenly method, for much of the honey will be ſmeared about the box.

181. The ſame objection that has been made againſt the frames, holds equally good againſt the ſliders in the middle and bottom of the boxes. For being of wood, and the whole breadth of the box, they will be far more difficult to introduce than any we have yet mentioned.

182. Mr. T. Wildman aſſerts, (page 156.) "that as there are but three combs in each ſeparate frame, the Queen at any time may be diſcovered." It does not appear ſo to me; and moſt connoiſſeurs in Bees know, that except at the moment of depoſiting her eggs,

if there be but two combs, the Queen will be in the middle, and ſo ſurrounded by her attendant Bees as not to be ſeen, unleſs through mere chance, by the beſt pair of philoſophic eyes in the kingdom. If a hive conſtructed entirely of glaſs (as a globe) will not preſent us with an opportunity of beholding her Majeſty, much leſs can we expect it from ſo partial an opening as that of a ſide or back window.

183. But the grand object principally intended by his plan, and that of ſeveral others, is the taking the honey frequently; as being then, ſay they, much ſuperior in goodneſs than it would be if left 'till the end of the ſeaſon. Conformable to this deſign is the conſtruction of Mr. T. Wildman's ſtraw hives as well as of his boxes, conſequently the ſame ſtrictures will ſo far apply to both.

184. That honey taken in the ſummer is better than what is taken in autumn is by no means ſo clear a point. Becauſe, as ſoon as cells are filled with honey, they are ſealed up with wax; which is full as effectual to preſerve the ſpirit and fragrance of the honey, as the beſt glaſs phials, even though they have ground glaſs ſtoppers. If honey be depoſited in virgin cells it will ſuffer no diminution of its goodneſs, nor alteration in its colour, however long it may be kept there; but if laid up in old cells, it will in a very few days become darker coloured.

185. I acknowledge, that honey taken at the time when the moſt aromatic flowers are in bloom, is preferable to any other; but then this may be done, and beſt done too, by glaſſes, or other ſmall veſſels placed upon the tops of the boxes or hives (431, 452, 462.) without any additional expence, and with very little trouble. In other reſpects; one of my hives or boxes, taken when full, will have honey and wax equal in quality to any from his ſhallow hives.

186. Beſides, there will often be brood in the ſhallow hives when taken off, nor will they yield ſo much virgin honey as might be ſuppoſed I tried Mr. T. Wildman's ſhallow hives three ſucceſſive years, but they afforded me not near the profit I gained from thoſe Stocks of the ſame years which were managed in my own way.

187. Mr. T. Wildman has introduced into his practice tops for his ſtraw hives with circular holes; theſe I am apt to think are rather diſagreeable to the Bees, as they oblige them to build their combs out of the uſual ſtile of parallel lines, and to vary them, in many curved directions, according as the holes interfere. If holes are thought moſt proper, they ſhould be made in double rows as near as poſſible to each other, and in ſtraight lines, leaving proper vacancies between every double row, for the combs to be fixed to.

188. It will not, I hope, be thought impertinent if I here make a ſlight digreſſion,

for the ſake of obſerving, that when ſuch Swarms as came from the Stocks of theſe hives that had tops with holes in them, were put into hives with bars, they nevertheleſs made their combs ſome curved and ſome oblique, and this for two years in ſucceſſion; which evidently proves, that the old Bees go out with the Swarms, and that thoſe young Bees of the ſecond year, which ſaw the manner of building in the hive they left, purſued the ſame plan when they formed a part of the next ſpring Swarm *. It alſo proves, that the elder Bees are the principal architects.

188. Perhaps it may not be improper to make ſome further brief remarks upon Mr. T. Wildman's ſtraw hives, and by comparing them with thoſe I propoſe, ſome judgment may be formed which is the ſimpleſt, eaſieſt, and moſt beneficial; and from thence inferences may be readily and juſtly drawn reſpecting all other kinds of hives and boxes.

189. His ſtraw hives are ſeven inches high and ten wide; in the upper row of ſtraw a hoop is faſtened, and to this are nailed five bars, each one inch and a quarter wide. In one of theſe hives a Swarm is firſt to be put, and another placed under it the next

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* From this circumſtance a queſtion may ariſe relating to Inſtinct, which is ſuppoſed to act invariably. For, how is it poſſible that faculty could impel theſe inſects to deviate from a ſtraight line, and to carry on their work in directions ſuited to their new habitation? Was there no ratiocination employed?

next morning. This next morning's work my hives do not require. But why the *morning*, when in the next evening it may be done with more eaſe and ſafety? Soon after a third hive is to be placed under the two former; but whether at night or in the morning we are left in the dark. At the end of about three weeks, the top hive is to be taken off, at the noon of a fair day (611), and a *fourth* hive is then to be placed under thoſe that are left. After a while another hive is to be taken off and a fifth added, obſerving that the firſt hive taken off, is to be reſerved, leſt it be wanted to be replaced again in the winter.

190. To perſons who have nothing elſe to do but tend Bees, like Mr. Wildman, theſe repetitions of *taking off* and *putting on*, may be a very pretty amuſement. *Provided*, however, that the Bees be like the common flies, that is, without ſtings. For moſt aſſuredly, the combs of theſe ſhallow hives will be ſo extended and fixed down to the bars of thoſe underneath, that in taking one off (the manner of doing which however we are not made acquainted with) force muſt neceſſarily be uſed to diſengage the combs, part of which breaking, clumps of them will be left upon the bars of the under one, and prevent a cover being placed on, until they be removed; during which time, the Bees of the hive taken, and of thoſe left, having free egreſs and regreſs, will ſoon make the Apiator heartily

ſick of his operation, and Mr. Wildman's invention.

191. But ſeriouſly, can it be thought, that farmers and cottagers will or can ſpare the time and attention that this method requires, or indeed that the profit, eſpecially in counties conſiderably diſtant from the metropolis, will anſwer the expence and trouble. Moreover, the diſturbing the Bees ſo much, together with the ſhaking of the combs, and perhaps cauſing ſome to fall out (being done in the heat of ſummer) ſo intimidates and diſheartens the Bees, that they ſeldom work with their wonted vigour and alacrity the whole ſeaſon after.

192. My propoſal is to have only two hives to a Stock. Fewer can by no means be diſpenſed with upon any plan to perſerve the Bees. Theſe require but one removal. By means of the ſliders, the Bees of the hive left are always confined during the operation; and where an additional frame is uſed, thoſe of that taken off will be kept in alſo. But if this be thought too expenſive; ſeveral methods are pointed out in the following ſections (592, 599, 600, 602, 605.) of doing it with ſecurity, and with little or no apparatus. And the time of adding or taking a hive will require no other inſpection than the caſual one of the Apiator, or ſervants of the family as they paſs the Apiary *.

193. Mr.

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* I would juſt obſerve here, that the combs of that hive which Mr. Wildman directs to be taken off in order

193. Mr. Wildman further obſerves, "that "the Queen will lay ſome eggs in the up-"per hive, but ſo ſoon as the lower hive is "filled with combs, ſhe will lay moſt of "them in it. In little more than three "weeks, all the eggs laid in the upper hive "will be turned into Bees." Very often it will be ſo, but as often the contrary. I have taken not only his ſhallow hives, but alſo common round top hives, that had been raiſed three *months*, and yet when taken were as full of brood as though no under hives had been placed (106, 193, 472). Which proves this theory fallacious. There is no certainty in any of theſe methods of not having brood in additional hives, placed either by the ſide or underneath. The only ſure way may be ſeen (473).

194. The inconveniences of narrow bars I have already taken notice of (190) as being much worſe than where the openings are only in the middle. Straw hives have been formed upon that principle both here and in France, and ſmoke uſed to cauſe the Bees to aſcend into an upper hive. But as we can perform it with more facility and and leſs offence, (592, 605) it will be unneceſſary

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order to be replaced in winter or ſpring, leſt the Stock ſhould have ſhort commons, will be liable (however well ſecured) to become mouldy, and the honey candied; or the moth may get in and deſtroy the whole.

ceſſary here to enlarge further upon the impropriety of it.

195. My hives have four openings, in the whole of thirty four inches, which though not equal to Mr. Wildman's barred hives, are yet fully ſufficient for the Bees paſſage, as every comb will have a free paſſage of communication from it, either upwards or downwards. The communications of my boxes are alſo forty-four inches in length; whereas thoſe boxes that have no bars, ſeldom have more than eighteen inches. So that they have here a ſuperiority of twenty-ſix inches. But what is ſtill of more advantage, the Bees can crawl up and down the ſides and ends of my hives and boxes, without obſtruction. And when the combs are built, can deſcend by them in direct lines to an under hive, as though it were but one hive, and adapted to their own peculiar mode of architecture. Nor is this chimerical: the Bees have often furniſhed me with demonſtrative proofs of the truth of it, either working upwards or downwards as I choſe to have them. (473, 492.)

196. My ſliders have alſo the advantage, for, being four in number, and furniſhed with ſharp edges, they are introduced, not like the large wooden ſliders, all at once, and with great violence, but gradually and alternately ſliding in eaſily, and with little or no diſturbance; eſpecially in boxes ſet in a houſe. The Bees will neither know

the cauſe nor the invader. This operation therefore does not require even ſo much as a pair of gloves to perform it in. Neither ought we to forget the advantages ariſing from the ſecurity of the Queen; of which we before obſerved (165, 166,) the very great importance.

197. By means of theſe ſliders, glaſſes may be ſet equally as well on the ſtraw hives as on the boxes (452) without any ſort of danger or difficulty. My ſtraw hive tops have alſo a great ſuperiority over all others, of allowing an inſpection into the ſtate of the Bees works at the top; for by putting the ſliders in at any time, than taking off the cover, and, after placing a ſlip of glaſs over either of the communications, withdrawing the ſlider, not a Bee can come out, and curioſity may be ſatisfied without any danger; which will not only be entertaining but, on many occaſions, uſeful.

198. The laſt point of compariſon we propoſe to examine, is the expence or difference of value of Mr. Wildman's ſtraw hives. Five are required to one Stock; and each hive will coſt one ſhilling, which is five ſhillings the ſet. Of mine two only are neceſſary for one Stock; the expence of which is two ſhillings. His hives have ſtraw tops; ſo have mine. But each of his hives has a hoop faſtened in it with ſeven bars, which I will eſtimate ſo low as only ſixpence each: this is two ſhillings and ſixpence more.

Each grooved top of mine will coſt two ſhillings; which with the hives amount to ſix ſhillings for my ſet; while his ſet comes to ſeven ſhillings and ſixpence.

199. But there is ſtill a greater difference in this reſpect. For his hoop and bars, being fixed, are not applicable to other hives; and as ſtraw hives in two or three years are not fit for ſervice, the whole muſt be new. My tops, on the contrary, being moveable at pleaſure, and ſuiting each hive indiſcriminately, will with care be durable, perhaps for centuries, and therefore ought not to be eſtimated with the prime coſt of the hives; the ſame may be ſaid of my ſliders. The extraordinary expence for each Stock, the firſt year, will be four ſhillings for tops, and two ſhillings and ſixpence for ſliders.

200. But for every ſucceeding year, the expence will be but two ſhillings at moſt, reckoning a hive for a Swarm, and another to raiſe the Stock with; and this will frequently be unneceſſary, becauſe an additional hive will not often be above three or four months in uſe before it be taken away, and therefore will be hardly the worſe for uſe; ſo that upon the whole, it is but a trifling advance more in keeping Bees this way than in the old one of *ſingle hives*. Nay, the expence may be ſtill very conſiderably leſſened to perſons that make their own bars without grooves, as directed, (153).

201. But let us now ſuppoſe that only twenty pounds extraordinary of honey and wax be obtained the firſt year from ſix Stocks; will it not be a ſufficient compenſation for the extra expence? Moſt certainly it will; and therefore the whole apparatus may, the next year, be fairly conſidered as coſting nothing. Nor is this all, for the pleaſure of managing the Bees more profitably and with greater eaſe, may ſurely be added. All theſe conſiderations ought, I think, to have ſome weight with every prudent and ſenſible perſon.

202. As to the price of Mr. Thomas Wildman's boxes, I am not acquainted with it. But as they are more complicated than mine, it is reaſonable to ſuppoſe, that the expence muſt be greater in proportion. We may, however, give a ſhrewd gueſs at this, from obſerving the price of his nephew's boxes. In his Treatiſe, Mr. D. Wildman, though he calls it *complete*, has forgot to give the dimenſions either of his hives or boxes; but the laſt I take to be rather more than a foot ſquare. One of theſe with four glaſſes, each containing about half a pint, and one about three times as large in the middle, together with a cover to put over them, comes to two guineas. The wood-work is of mahogany.

203. His ſtraw hives, about ſixteen inches diameter, and eight deep, with ſeven glaſſes and ſtraw cover, half a guinea. The expence

of one of my ſtraw hives, with barred top, and ſix half pint tumblers, ſingle flint, and one quart tumbler for the middle, will be eight ſhillings, viz.

Glaſſes - -	5s.
Hive - -	1s.
Barred Top - -	2s.
	8s.

204. A pair of my boxes, made of painted deal, with moveable top and bottom, will be twelve ſhillings.

205. A pair with three large panes of glaſs in the three ſides, braſs hinges, moveable top and bottom, all of painted deal, one pound four ſhillings.

206. Theſe are the extreme prices for which any ingenious carpenter will make them. No further comment is here wanted, every one's reflection muſt readily make it.

CHAPTER IX.

RULES *and* CAUTIONS *to be obſerved in the Purchaſing and Removal of* BEES.

207. THE two ſeaſons moſt proper for purchaſing of Bees are, the ſpring for Swarms, and the autumn for Stocks. The beſt ſwarms uſually riſe from the middle of May to the middle of June.

208. If a perſon commences Bee-maſter, or Apiator, in the ſpring, he ſhould ſend his own hives or boxes to the neighbours he intends to purchaſe of any time before April, that they may be in readineſs againſt the Swarms riſe. But there will be danger of impoſition unleſs the bargain be made for a Swarm that will at leaſt meaſure a peck; and therefore a ſmaller Swarm ought by no means to be put into the hive.

209. When the hive is furniſhed, and before it is brought away in the evening, it ſhould be held up and examined whether the cluſter of Bees be as bulky as it ought to be, if not, it ſhould be ſtruck out upon a cloth, and another hive ſet over it (260). In this caſe, a better Swarm muſt be patiently waited for; otherwiſe, the firſt large Swarm that ſhall riſe, may be bargained for among the neighbours; this ſhould be brought home the ſame evening, when being diſplaced from

the hive they are in, the intended hive ſhould be placed over them, and they will ſoon aſcend therein.

210. A ſmall Swarm will not only yield no profit the firſt ſeaſon, but if the weather be unfavourable, and the ſituation bad, it will be very likely to periſh before the next ſummer. A Swarm that will nearly fill one of my ſtraw hives, may be called a very good one, and will turn out ſweetly profitable before the autumn comes on. If a large Swarm cannot be procured, two ſmall ones, united in one, (260, 366.) will anſwer the purpoſe as well.

211. If the Bees be not brought home the ſame evening that they ſwarmed, many of them will return to the place were they ſtood; and not knowing where to go, will be loſt.

And not only ſo, but if kept two or three days before they are brought home, ſeveral combs will be formed, which being new, and conſequently very tender and warm, a ſlight motion will cauſe them to fall, ſmothering many of the Bees, perhaps the Queen herſelf, and thereby occaſion the loſs of the whole. But if through neceſſity of any kind, the Swarm be kept ſo long, two or three o'clock in the morning will be the ſafeſt time to bring it away, as then the combs will be the cooleſt.

212. September or October are the two beſt months to buy Stocks in. But it will be proper, if you are not converſant in Bees, to

take the judgment of ſome ſkilful and diſintereſted neighbour. For it is abſolutely neceſſary that the Stocks ſhould be examined before they are purchaſed. Perhaps by attending to the following directions you may become a competent judge yourſelf.

213. For performing this buſineſs, a cool day, or a fine calm evening, or rather than either, the break of day, as at this time the power of ſtinging is weakeſt, is to be preferred. Windy or rainy weather is improper for this purpoſe, as it makes the Bees very fretful and quarrelſome. The armour (73) will here be proper, or at leaſt the face ſhould be well ſecured. Gently turn the hive up upon its edge, high enough to have a full view of the Bees and combs; if there be many Stocks you want to examine, as ſoon as the Bees become too troubleſome, leave them for about half an hour, or until they ſeem tolerably quiet; and then in like manner proceed with the reſt. But the beſt way will be to uſe the meſh or grated board, hereafter mentioned (600, 602.)

214. Obſerve that if the combs, as far as you can ſee, be of a white colour, or of a ſlight tinge of yellow, they are the produce of a Swarm of this year; but if of a very very deep yellow or browniſh colour, the Stock is of the preceding year. When the combs are of a very deep brown, or black, the Stock is certainly an old one, perhaps three or four years old, and totally unfit for

your purpoſe. Theſe require a more cloſer inſpection, as a ſudden glance will not diſcover the truth; for the bottoms and ſides of the combs, though apparently new, are often made by old Stocks, while the reſt of the combs may be of three or four years ſtanding.

215. The ſpaces, or ſtreets, (if I may be allowed to call them ſo) between the combs, ſhould be well crowded with Bees, and the combs themſelves well ſtored with honey, down to the floor, or nearly ſo. If this is not the caſe it is a ſign it was a Caſt, or a Stock too poor to form a thriving Apiary with. A good Stock will weigh from twenty-five to forty pounds; but in old Stocks, the weight cannot be depended upon, (628.) which is another reaſon againſt buying ſuch.

216. It will be more advantageous to purchaſe a good Stock in autumn, than a Swarm in ſpring. For there will be little riſk of ſuch a Stock's proſperity until the next ſeaſon, when moſt probably it will afford a Swarm; ſo that for the ſame price, you may be ſaid to have both Swarm and Stock. Whereas, if a Swarm be bought in the ſpring, there will probably be no advantage until the next year.

217. In the vicinity of London, the price of a Stock or Swarm is uſually half a guinea; but in diſtant counties ſeldom more than half the money; though ſome country people are ſo ridiculouſly ſuperſtitious as to ſuppoſe, that Bees will not thrive unleſs *gold*

be paid for them. What abſurdities are there, however groſs, which the human mind has not adopted at one time or another?

REMOVING.

218. It muſt be in the duſk of the evening, when all the Bees are at home. But ſome hours previous, the hive ſhould be raiſed a little from the floor, by bits of ſticks, or tiles, &c. otherwiſe, when the hive is ſuddenly taken off, a great number of the Bees will remain on the floor. A cloth that is not of a very cloſe texture, ſhould be laid ready upon the ground before the Stock, then gently lifting up the Stock, ſet it upon the cloth, and immediately gathering the corners up very tight, tie them together at the top; and laſtly, tie a cord round the body of the hive; this will effectually prevent any of the Bees eſcaping, or crawling up to the top. When brought home, ſet each hive upon the ground, near the ſtand it is deſigned for, untie the cloth, and lifting the hive off, ſet it upon the ſtand, and lay the cloth with the Bees on it over the hive; before morning they will go down into the hive, and none be loſt. If the hives are to be placed in a Bee-houſe, they muſt not be ſet cloſe to the front, for then the Bees on the cloth cannot have entrance at the doorway;

way; but the next evening they ſhould be ſhoved cloſe.

219. As the ſtraw hives in common uſe project more in the middle than at bottom, conſequently when placed in a Bee-houſe, a vacancy will be left between the hive and the front. This chaſm ſhould be filled up by cutting or hollowing out a piece of wood in the middle, ſo as to be very thin there, and about three inches long, leaving the ends ſufficiently thick to fill up the vacancy; if it does not exactly fit, a little clay, or cow-dung, will ſupply the defect, as it is only to be uſed at firſt, until the Bees have worked themſelves into a box.

CONVEYANCE.

220. The beſt way of conveying Swarms or Stocks from one place to another, is in a hand-barrow between two men; the next to that is by a milk-yoke, with a hive on each ſide, or one or more hives may be hung upon a ſtout ſtick, reſting upon two men's ſhoulders. But where many are to be removed, or when they are to be carried ſeveral miles, a poſt chaiſe, coach, or any other vehicle that has an eaſy play upon ſprings, is to be preferred: the hives muſt be carefully placed upon a thick bed of ſtraw, and the motion of the carriage ſlow and gentle.

For want of theſe, a cart may do; adding the more ſtraw, and taking care that the horſes proceed only in their ſloweſt pace; otherwiſe the combs will probably be moſtly ſhaken down, and the Stocks ſpoiled.

CHAPTER X.

Obſervations on the Increaſe of BEES, *and Nature of* SWARMS.

221. THE increaſe of Bees is of very great importance to the owners, for in proportion to *that* will be the profit, and therefore every thing relating to this deſerves a minute detail.

222. The breeding of young Bees is begun ſooner or later, in proportion to the prolific nature of the Queen, the ſtrength of the Stock, and the ſtate of the weather. The more numerous the Bees are in a hive, the greater the heat, which enables the Queen of ſuch Stocks to begin breeding much ſooner than the Queen of thoſe that are poor and weak; the brood of which increaſe but ſlowly, and are therefore later. If the weather be mild the Queen will ſometimes begin to breed in January, but often in February, except the ſeaſon has been very cold, and is

very backward, and then it will be March firſt.

223. For a long continuance of cold weather, or of both cold and wet, greatly retards the hatching of the brood, and cauſes many abortions, which may be ſeen thrown out of the hives in ſuch unkindly ſeaſons. But when the ſpring is neither very early nor very late, there will be the greateſt brood, and conſequently the moſt numerous Swarms.

224. For as the influence of a mild ſpring haſtens the brood, it no leſs haſtens the bloſſoms. The ſallows, the ſnow drops, and crocuſſes, thoſe welcome harbingers of joy and abundance to the Bees, (512.) afford them at this time plenty of farina, without which their young cannot be ſuſtained or fed. But ſhould wet weather ſet in, while theſe are in bloom, ſo as to prevent their going out to collect it, thoſe already bred, will pine for want, and very few will be added to the number until a more propitious change. So that we ſee there muſt be a coincidence of weather and flowers to produce timely and large Swarms.

225. It often happens that there is a long ſeaſon of proper weather for gathering farina, (515.) even to the latter end of May; but too cold for any flowers to afford honey. During this tedious interval, the Bees having nothing elſe to do, their whole attention will be fixed ſolely to the increaſe of their family, not conſidering that famine will ſoon begin to ſtare them in the face.

226. Like too many of our own unthinking ſpecies, who eagerly ſeize the bliſs of propagation, ſupport the offspring who may! Thus the Bees, having already a large family, and that encreaſing daily by hundreds, at the ſame time that the honey is wholly or nearly exhauſted. In this perilous dilemma, they muſt either ſtarve or leſſen their numbers. Irreſiſtible neceſſity compelling, they divide, and a Swarm riſes; which ſurely dies, if a warm ſeaſon does not immediately ſucceed.

227. But if no young Princeſs be ready to lead a Swarm, the ſuperabundance of Bees will in a ſhort time conſume the ſmall remains of honey, and the whole will periſh by famine, at a time, and from a cauſe the leaſt ſuſpected, and often ſo late as the end of May.

228, May and June are accounted the two beſt months for Swarms; for thoſe that riſe much ſooner or later are either too few to form good Swarms, and are in danger of being ſtarved, or by coming too late, impoveriſh the old Stock by too large a decreaſe; and themſelves not being able to lay in a ſufficiency of ſuſtenance for the winter, will run the utmoſt hazard of dying alſo. To the middle of July I have had Swarms, and known many others, that have ſucceeded; but later than this none ſhould be ſuffered to ſwarm. The beſt method of accompliſhing this is to raiſe the Stocks (231).

229. If the ſpring has been good for

breeding, but no honey gathered until late, as perhaps until the middle of June, however *capacious* their *hive* may be, the Bees will certainly ſwarm. This is repugnant to what ſome writers have taught; truſting to whom I have loſt many Swarms, by neglecting to have them watched; and there is no doubt, but many others have done ſo too, and ſuffered the ſame loſs. Long and great experience has ſince fully convinced me of the fallacioùſneſs of this principle.

I have had Bees both in boxes and hives that increaſed ſo faſt, and ſeemed ſo crouded, that to prevent their ſwarming (as I then thought) they were raiſed gradually three ſtories high. But notwithſtanding all theſe precautions, every one of them ſwarmed, nay ſome of them caſt beſide; and in ſuch indifferent weather, that no one could have ſuſpected any Swarms would have riſen. One year in particular, though my Bees were ſo prone to ſwarm, ſeveral of the neighbouring Stocks, being over charged with young, were obliged to lie out for want of room, and did not ſwarm at all. In this inſtance we obſerve, *plenty* of room induced mine to ſwarm; while others for *want* of room, laid out, and never attempted to ſwarm.

We may further notice, that in hollow trees, and under the roofs of houſes, which afford the Bees unlimited room, yet it is well known that even in theſe ſituations they always ſend out Swarms.

230. On the contrary, when *honey* is to be met with *early*, and in *plenty*, and the Bees have abundant ſpare room, it is a great chance if they ſwarm at all; not being willing to leave a houſe well furniſhed to go in queſt of a new habitation, as here every thing will be wanted. What more confirms me in this opinion is, that in the ſummer of 1779, a very remarkable one for the production of honey, only two of my Stocks, which I purpoſely had not raiſed, ſwarmed. The reſt filled their hives ſo faſt, that I was obliged to raiſe them twice. While the Stocks of the country people in the neighbourhood, ſwarmed, and caſt ſeveral times; nay Swarms produced Swarms; (or as the country people phraſe it) had maiden Swarms.

231. This was owing to there being plenty of Drones, and of young Princeſſes ready to lay; ſo that their hives being too ſmall to hold them, the honey, and young brood, and their owners not poſſeſſing ingenuity enough to aſſiſt them, they could do no otherwiſe than divide. To this cauſe alſo it is owing, that Stocks are obliged to ſwarm and caſt ſo often as to impoveriſh themſelves intirely. Similar obſervations were made by Butler in the year 1616. Herein the Bees act like parents affectionate to exceſs, who ſtrip themſelves to enrich their offspring, and by that means become expoſed in the winter of old age to all the rigours of poverty.

232. The more pregnant Princeſſes there are, the more eager the Bees are to ſwarm (other favourable circumſtances coinciding). On the contrary, if none of *theſe* are ready, be the quantity of the Bees ever ſo many, no Swarm will riſe, but will rather die than quit the hive. This fact has been fully aſcertained by the examination of Stocks, which could by no means whatever be induced to ſwarm, and were always found with only the old Queen; the royal eggs, or embryos, having failed, or been deſtroyed by accident.

233. Early Swarms are not always beſt, viz. from the entrance of April until the middle of May, the weather often changing from one extreme to another; which either ſtarves or otherwiſe ſo reduces them, that they become of little worth. But there is no rule without exceptions. For I have known early Swarms which multiplied ſo much as to produce a maiden Swarm ſo late as the 30th of July, and proſpered. I alſo knew two old Stocks that produced ſix Swarms the ſame ſeaſon, moſtly good. But it was in an excellent ſeaſon and ſituation, and no other Stocks near them. Such Stocks with me, inſtead of thus increaſing, would not have ſurvived the winter. Moreover, in ſuch favourable ſituations, many Swarms have riſen about the ninth of May, though very cool weather, with northerly winds, and which continued ſome weeks. From theſe circumſtances I inferred that they would

not be able to procure ſuſtenance. They deceived me however, for they not only lived but proved vigorous and proſperous. Such difference is there in ſituations!

234. A large early Swarm, with favourable weather ſucceeding, will be far ſuperior to one that is later; for having ſo much time before them, they will be well repleniſhed with ſtout young labourers, ready to reap the honey harveſt, the ſweet reward of all their toil. The Mother Stock, at the ſame time, will be in the ſame thriving condition: the old proverb applying here moſt admirably, viz. "Many hands make light work." If bad weather, indeed, ſhould ſupervene they will require a little attendance and expence in feeding; for which their future toils will more than doubly compenſate.

235. Butler has given us a judicious ſtandard to judge of the propriety of the time of Swarms riſing, viz. "that Swarms be-
" fore the blowing of *knapweed*, are in good
" time. Thoſe before the blowing of black-
" berries may proſper. But blackberry
" Swarms, eſpecially Caſts, will be ſeldom
" worth keeping, as being too late to lay
" in a proper ſtore for the winter. Such
" ſhould be returned back to the Stock."

236. In another place he obſerves, "that
" in ſome backward years, as was 1621
" and 1622, there have been Swarms the
" latter end of July that proſpered. For it
" is remarkable, the bramble did not blow

"until that time, which uſed to blow a "fortnight ſooner.

"So in warm countries, and a kind ſpring, "Swarms have come early in May; whereas "in the heath countries Swarms are as late "as near the end of July, which often prove "better than the early." Near woods the Bees obtaining from the trees plenty of farina to feed the brood with, is the reaſon why Stocks, in ſuch ſituations, have large Swarms, and early.

237. The common working Bees are firſt bred, then the Drones and Princeſſes. In general, the Drones do not appear until the middle of May, but large Stocks will ſometimes have them as early as March, in April very common. Hives will often be ſo full of Bees as to cluſter out before any Drones ſhew themſelves; and, for want of which, they will not ſwarm; not but there may be a few Drones in the hive, though not ſufficient in numbers to make their appearance: or the air may be too cold for them, though not for the Commoners; for the Drones are much tenderer than theſe. When they are moſt numerous, the Swarms are moſt likely to riſe. If this happens early, in general ſo will the Swarm be; if late, the contrary.

238. Butler obſerves, that ſometimes the firſt brood of Drones in the ſpring will be killed, and caſt out. I obſerved a ſimilar inſtance in a Stock, which in the beginning of May was full of Bees and Drones, but the middle of the month affording plenty of honey,

ney, to make room for it, they not only killed the Drones, but the brood alſo; hundreds of which lay before the hive.

239. The generality of country people are ſo ignorant of the nature of the Drones as to imagine they are doing great ſervice in deſtroying them as ſoon as they appear; which is full as wiſe, as if they were to kill *all* the males of their flocks or of their poultry, in order to have the more chickens or lambs. Good dames! if you love your huſbands, cheriſh the Drones, for they cheriſh the Queen, even as your huſbands cheriſh you!

240. I have experienced, that in a ſummer, extremely dry, few Princeſſes were born, and many of the Queens dying of old age (as I ſuppoſe) there were but few Swarms, and many Stocks deſerted their hives for want of Queens. Though this was the cauſe, few perhaps knew it, and therefore other cauſes were aſſigned.

241. As witchcraft in ſeveral counties is ſuppoſed to do a great deal of miſchief; in theſe, and ſimilar caſes, ſuch loſſes will be attributed to it; and he who ſhall dare to diſbelieve it, will be conſidered as an atheiſt. But what is this witchcraft? a power ſuppoſed to be communicated by the devil, or by many devils (for the chief cannot be omnipreſent) to ſome ugly croſs old woman, to do what miſchief ſhe pleaſes to her neighbours, who do not pleaſe her; an opinion founded in paganiſm, nurſed in ſuperſtition, propagated by oral tradition, and believed with as

ſteady a faith, by theſe credulous ſimple ones, as the moſt ſacred tenets of the Goſpel. Such people ſhould conſider, that if Providence "ſuffers not a ſparrow to fall without his "permiſſion," it muſt be the height of abſurdity to ſuppoſe, that infinite wiſdom and goodneſs will permit, much leſs give a power to dæmons, or women, becauſe they are *old* and *ugly*, to injure their neighbours, in a ſupernatural manner, according to their own capricious, fooliſh, and unjuſt reſentments.

242. Doubtleſs the lovely females, blooming in virtue, youth, and beauty (ſuch is the will of Heaven) have always had an inherent power of faſcinating the mind and body of man: and this has been exerted not only among the gentle ruſtics of the peaceful village but emperors and heroes, philoſophers and divines, recluſe monks, and men of buſineſs, have all *felt* and yielded to its irreſiſtible ſway.

But from ſuch a wonderful influence the Bees are entirely exempt. What diſaſters befal them generally ariſe from the ignorance or indolence of thoſe who ſuperintend them.

243. A Swarm conſiſts not of all young, as many falſely imagine, but of a Queen, of Drones, and of working Bees, both old and young; and ſuch as happen to be at the doorway, when a Swarm riſes, go off with it.

244. The lying-out, or cluſtering of Bees, on the outſide of the hive, is often a great diminution of the expected profit; and alſo accuſtoms them to habits of idleneſs. It is occaſioned by the continual and large increaſe of

young, whereby the hive becomes ſo crowded, and in the day time ſo hot, as to oblige great numbers of Bees, to lodge or cluſter on the outſide, and about the door-way and front of the hive. Frequently at firſt they only lie out in the day-time; at night the hive being cooler, they are collected cloſer together, whereby the whole are admitted: but unfavourable weather, the want of a Princeſs, or of Drones, preventing their ſwarming for ſome time, they become too numerous for the habitation to hold them, either night or day.

245. Pure neceſſity obliges them at firſt, but afterwards they contract a liking to their new ſituation; others alſo daily join them in their idleneſs, and in ſuch numbers, that often there are as many Bees on the outſide of the hive as within. In conſequence of this, the young Princeſſes, who always reſide within, not having a ſufficient number there, or inclination to form a Swarm, none will riſe; until growing too late in the ſeaſon for ſwarming, they at laſt betake themſelves to build ſome combs by the ſides of the hives, or under the floors, and there remain until autumn: not but there may be ſome exceptions. I have known Stocks increaſe ſo faſt, that notwithſtanding theſe exterior cluſters, they have ſwarmed, and left the idlers behind; who afterwards perceiving room enough within, quitted their ſtations, and entered the hive again.

246. It not unfrequently happens that their lying out, and that for ſeveral weeks, and

with favourable weather, is owing to there being no Princeſs yet born, or in a condition to lead them. This I conjecture from having many times obſerved my box-hives crowded, well ſtored with Drones, and the Bees ſeemingly deſirous of ſwarming, but yet did not, for a conſiderable time. Now as ſeveral royal cells were cloſe to the windows during this time, but not finiſhed or ſealed up, no Swarm roſe until ſome time after they were ſo: on the contrary, when there is a very forward Princeſs, or perhaps ſeveral competitors, a Swarm will riſe without any previous indications, and when the hive is far from being crowded; conſequently ſuch Swarms will be always ſmall.

247. It is obvious, that a large quantity of Bees lying out inactive, at the moſt critical time, when their labour might be of the greateſt ſervice, muſt be a very conſiderable loſs to the owner. For inſtead of this, if they had ſwarmed in that time they might have filled a hive with honey, or produced as much in an additional hive, had one been furniſhed them. A ſtrong indication this in favour of our double method. Another inconvenience is their hindering and obſtructing the paſſage of the other Bees, and by their example inciting many others to be as idle as themſelves; No uncommon caſe among idlers of the human race! Nor is this all, for having obtained this indolent habit, it will be communicated to the next generation; for it is obſerved,

that Bees from theſe Stocks are much more apt to lie out than any others. For the prevention, ſee (249).

248. Many perſons on ſeeing ſuch cluſters of Bees upon their hives, have imagined, that by getting them into an empty hive, they ſhould have a complete Swarm; but thoſe attempts have always been unſucceſsful, all the Bees uniformly returning home again, and cluſtering as before. The reaſon is, they have no Queen with them: without whom no ſeparate Swarm can poſſibly be eſtabliſhed. For the treatment of Bees that lie out for want of previous care, ſee (282).

249. An objection perhaps may be made againſt the raiſing of hives, in order to cure them of lying out, viz. that it will prevent their ſwarming. It has been ſhewn, that it has not always that effect (229). But if it had, they had better not ſwarm at all than lie out. The Bees themſelves will be the beſt judges; but, ſuppoſing they do not ſwarm, they are not idle, but fully and continually employed in compleating their own hives, and filling the new apartment you have enlarged their habitation with. We will likewiſe ſuppoſe ſo bad a ſeaſon, that they cannot ſpare you a hive of honey the preſent ſummer: Notwithſtanding this, as their increaſe of brood has been continual, the next year they will make you amends for your forbearance: by being not only a powerful Stock, but alſo by complimenting you with a large and

early Swarm; and probably, with a hive of honey, as an additional recompence.

250. Several ſigns or tokens are deſcribed by different authors, portending the *riſing of Swarms.* Thoſe of moſt note, I ſhall preſent to my readers. The firſt ſymptom of a Stock's being nearly in a condition of ſwarming, is their populouſneſs, and the appearance of Drones. The firſt is known by the more than ordinary concourſe of Bees going in and out. Alſo, by rapping againſt the body of the hive in the evening, judgment may be formed of their ſtrength by the buz; and when many of the Drones are ſeen, it denotes that there has been plenty of Bees for ſome time.

251. Hives that are very full of Bees will make a noiſe almoſt approaching to roaring; ſo much ſo as to induce one to imagine they are juſt going to ſwarm, it ſhews indeed their impatience to ſwarm, but alſo that they have no Princeſs as yet equal to the taſk; and therefore this noiſe may be continued ſeveral days before their flight.

252. Should a Stock in the morning, inſtead of working, remain playing about the hive, it is a ſure ſign they intend ſwarming that day, the weather permitting; but they as frequently riſe at the very inſtant that multitudes are going in loaded, many of whom go off with the emigrants. Uſually before their flight, there is an uncommon buz, that may be heard at a conſiderable diſtance. Hives that ſtand fronting the morning Sun will riſe earlier in the day than thoſe that ſtand to the ſouth or weſt.

253. Lying out is a ſign of their deſire of ſwarming. Firſt Swarms frequently riſe without ſhewing any *other* ſign than an increaſe of numbers. Firſt Swarms are often divided or broken, by ſome caſualty, as a ſudden ſtorm, dark clouds, ſhowers, thunder, or by tinkling before they have all done coming out. By theſe noiſes the remainder are intimidated, and ſtay behind; or if the whole be out, either fearing a ſtorm, diſliking their pitching-place, being too much diſturbed in the hiving, or loſing the Princeſs, they return back again. The Princeſs going out with them, being ſometimes too weak for ſlight, drops down by the way; in this caſe, ſhe may be often found, when if placed in ſight of the Swarm, the Bees will preſently ſettle round her.

254. A firſt Swarm, except it happens to be broken, is worth two or three after ones; or, as they are generally called, Caſts and Colts: but when this accident befalls it, if the next comes forth one entire Swarm it will be better than the firſt, though perhaps it may leave the mother Stock too poor. (231)

255. Butler obſerves (as do alſo ſeveral other writers both before and after him) that three or four nights before a ſecond Swarm riſes, there is a peculiar noiſe in the hive, very different from the uſual buzzing of Bees, and which is heard upon no other occaſion. Mills, * (who ſeems to be no Bee-Maſter) treats this as an illuſion of the imagination, ; I was of the ſame opinion, until accidentally ſtanding by

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* Eſſay on Bees.

my bee-houſe about ten o'clock at night, I was attracted by theſe very unuſual aud muſical ſounds. Perſons verſed in muſic can tolerably judge of an octave; ſuch theſe reſpective notes appeared to me, and ſuch alſo as could not be made by the wings, but ſeemed as if proceeding from a tube. What the intention of theſe notes might be I pretend not to determine; whether they be made at ſtated periods before ſecond Swarms riſe, is not much to our purpoſe; becauſe it is not likely that many Apiators will have either time or inclination to watch theſe notices, therefore it is a matter rather of curioſity than of utility.

256. Butler indeed, writes, that, "Firſt "Swarms riſe without theſe notices; but "after Swarms or Caſts hardly ever without. "From the 8th to the 11th day after the "firſt Swarm is departed, the other young "Princeſſes that are pregnant, will make "the like petitions. Conſent being had, "the young Queen the next morning comes "down near the floor, and there calls much "louder, and at the moment of ſwarming, "the notes are more frequent and ſhriller; "and then iſſues the buzzing multitude."

257. "If rainy or tempeſtuous weather, "prevents their ſecond or third Caſts, until "beyond the 14th day, one of the young "Queen's is ſlain on the morning of the 15th "day, leſt a ſedition ſhould be raiſed, and a "civil war overturn the empire.

258. "So ſenſible are the Princeſſes of "their tragical fate, if left behind, that ſome-

“ times two or three will accompany a ſingle “ Swarm; or if the weather continues indifferent a conſiderable time, often one more “ bold than the reſt, will coax as many companions as ſhe can, and though only a few, “ will lead them forth, truſting to fortune “ for ſucceſs.

“ If the firſt Swarm be divided or broken, “ the ſecond will call, and ſwarm the ſooner, “ probably the very next day, and thereby occaſion a third, or ſometimes a fourth, “ but all within a fortnight after the firſt; “ unleſs prevented by bad weather, or except in ſome extraordinary plentiful years “ and ſituations both for brood and honey “ gathering.”

259. When two or more Princeſſes accompany one Swarm they uſually ſettle in different cluſters; but thoſe of the ſmalleſt ſeldom tarry, joining themſelves to the larger body, the young Queen following.

260. As to ſecond Swarms, much leſs Caſts, very few are ever worth keeping, without the ſituation and ſeaſon have been uncommonly favourable. The reaſon is, the Bees of every Stock have to provide for, and take care of, a numerous brood, as well as to collect honey; but as after-ſwarms are but few in number, compared with the firſt, they muſt fall ſhort, in performing both theſe taſks in any degree adequate to what the firſt can do; but as they are more intent upon the increaſe of the brood than procuring honey in autumn they will not have a ſufficiency

of honey to ſupport them until the next ſeaſon, and therefore will die of famine. Or if taken, the honey will be but trifling; whereas, had they been united to a Stock, or ſeveral of theſe Caſts incorporated together ſo as to form a good Swarm, it would not only preſerve them for next year, but alſo yield a good profit.

261. It is uſual with the Bees before they ſwarm, to ſend out meſſengers or quarter-maſters to ſeek out and prepare proper habitations: empty hives left in a garden, will ſometimes be choſen. In ſuch a caſe, two or three hundred Bees may be ſeen going in and out, to clean the hive: on ſeeing this, you may depend upon a Swarm entering into it within a few days. I have often experienced this myſelf, as well as ſome of my neighbours. The ſame may be obſerved of hollow trees, vacancies under the roofs of houſes, and other ſimilar places.

262. It may be readily known that a Swarm has eſcaped, if the Bees in going in or out od not ſeem near ſo numerous as before.

263. Notwithſtanding all that has been written reſpecting the ſigns and tokens of the riſing of Swarms, I am fully ſatisfied from my own experience, that they are very fallacious, and not to be truſted to, without running the utmoſt hazard of loſing ſome of the Swarms; and I am well perſuaded that the only ſecurity is keeping a conſtant and cloſe watch over them, (278) from the time they begin to be con-

ſiderably increaſed until the ſwarming ſeaſon be over. For they will frequently riſe in ſuch very indifferent weather, and ſometimes ſo very early in the ſeaſon, that no one could have ſuſpected any ſuch thing. In theſe circumſtances they frequently fly quite away without ſettling at all; and without giving any previous ſigns, or intimations of ſuch a diſpoſition.

264. As no Swarm ought to be kept unleſs a good one, whether it be a firſt, a ſecond, or any other; but muſt be returned again (370) or united (366) it may be both uſeful and amuſing to eſtimate the weight, meaſure, and number of Bees, ſufficient to make what may be truly called a good Swarm.

265. "It has been found, (ſays Butler) "that a larger number than 40 or 50,000 "will not thrive together in one hive. "Swarms often amount to 30,000. A large "Swarm may weigh eight pounds, and gra- "dually leſs to one pound; conſequently, a "very good one weighs five or ſix pounds, a "moderate one four pounds. No Swarm "leſs than this ſhould be kept, but united "with others."

266. I diſagree with Butler in this. For I think a ſix pound Stock is full little enough to turn to a good account; eſpecially in the double mode; where they ought never to want room, conſequently ſuch a Swarm in a tolerable ſeaſon will furniſh a hive of virgin honey. Therefore, all Swarms, leſs than *ſix*

pounds, eſpecially in moderate ſituations, I would recommend to be united with ſmall Swarms or Caſts. If there be enough to make half a buſhel, it will be ſtill more eligible.

267. The following eſtimate is given us by different writers of the weight and number of Bees:

BUTLER.

280 to an Ounce
4,480 - - a Pound
40 or 50,000 to ten or eleven Pounds.

Natural Hiſtory of BEES.

336 to an Ounce
5,366 - - a Pound
43,800 - - 8 Pounds.

WILDMAN.

308 an Ounce
4,928 a Pound.

According to my own Eſtimate.

290 an Ounce
4,640 a Pound.

		oz.	*dr.*
915	Half a Pint	3	$2\frac{1}{16}$
1,830	a Pint	6	$5\frac{3}{8}$
3,660	a Quart	12	$10\frac{3}{4}$

		lb.	*oz.*	*dr.*
29,280	a Peck	6	5	6

Wincheſter Meaſure.

268. The diſagreement of weight and meaſure in theſe ſeveral experiments ſeems to ariſe from the different ſtate of the Bees at the time of examination; for certainly they muſt weigh and meaſure more when their bellies are full than when empty, the caſe of Stocks that die; alſo thoſe loaded with farina, weigh and meaſure more than thoſe only with honey. This was fully confirmed to me by experiments made at different times, which always varied; but from the

average of the whole, the calculation given ſeems nigheſt the truth, at leaſt it is ſufficient for any purpoſe the practitioner may require.

CHAP. IX.

PRECAUTIONS *and* RULES *to be obſerved in the Managing and Hiving of* SWARMS.

269. IT will be highly prudent to have your hives in readineſs before the Swarms are likely to riſe. For want of this neceſſary forethought many Swarms have taken French leave, and been heard of no more.

270. The inſide of ſtraw hives ſhould be rubbed with a ſtiff hair bruſh, or coarſe cloth, to get off the little bits or ſnags of ſtraw; which otherwiſe will occaſion the Bees a great deal of trouble and loſs of time to gnaw off, when they might be more uſefully employed in building their combs.

271. Boxes alſo ſhould be cleaned from all little ſplinters, or other roughneſs, and made as ſmooth as poſſible; every hole or crevice muſt be ſtopped up with putty, or the Bees, to keep out the air and vermin, will be

obliged to do it with propolis; for what you may do with one ſtroke in a moment will coſt them many minutes, and perhaps the labour of hundreds.

272. I uſe no other preparation to my hives; but perchance ſome good dames may not be ſatisfied with this ſimplicity, and therefore I would recommend to them if they muſt do any thing more, to rub the top of the hives with a mixture of ale and ſugar, or of ale and honey: but in boxes, the rubbing the upper part and ſides with wax will be beſt, as being not only agreeable to the Bees, but alſo enabling them to crawl up the hive with greater eaſe. Rubbing hives with ſweet herbs is of no uſe, for it is the honey at the bottom of the flowers that the Bees are fond of and not the leaves. How ridiculous to uſe *fennel*, a plant they hardly ever approach, as if *that* would intice them. In ſhort, they ſeldom diſlike their hives if they have got a goodly company, and a good *miſtreſs*.

273. Thoſe that continue to uſe common hives, ſhould have ſeveral of them, from two to three pecks each, in readineſs; becauſe Swarms differ ſo much in magnitude, that a two-peck hive may often prove too ſmall; but no Swarm ſhould be put into a hive leſs than half a buſhel. However, after the Bees are hived, if they be not contented and quiet, or lie out, it will be proper to raiſe the hive by placing two or three rounds or more of an old hive underneath ſo as to make it high enough to receive the whole.

274. Straw hives or boxes, with openings at top, have this advantage, that if not ſufficiently large, another can be immediately added without any difficulty. After having once put a large Swarm in one of my boxes, I perceived the Bees to be very much diſpleaſed, and in great confuſion; I immediately placed another box over them, but ſtill the uproar not only continued, but increaſed, and the Bees began to pour out of the box: conjecturing then, that they had loſt their young Princeſs, I examined the ground near the box, and found a ſmall cluſter of Bees, in the midſt of which was the Royal Lady. I immediately took her up, and placed her at the door-way of the box, from which the Bees were running; a ſtop immediately enſued, a retreat was ſounded, the emigrants returned, and nothing was to be heard but acclamations of joy.

275. If for ſeveral years together Swarms come late, and perhaps ſome Stocks do not ſwarm at all, though the ſeaſons be tolerably good, it may be taken for granted that the hives are too large, or the Stocks too many: on the contrary, if the Swarms be too early, and but ſcanty in number, it indicates the hives to be too ſmall: a ſingle year cannot determine this, ſeaſons being ſo very different from each other; ſomething therefore muſt be left to experience, and each perſons ſagacity.

276. Hives are generally ſpleeted, that is, ſmall ſticks are placed within the hives to

ſupport the combs, and keep them ſteady. Country people fix too many, and theſe alſo ſo improperly as to render it impoſſible to take the combs out without ſmaſhing and mangling them, by this means fouling and waſting the honey. The Bees are endowed with ability ſufficient to faſten their combs, provided the hives are not to be moved; but as this is requiſite, one ſtick fixed acroſs the hive, within about two inches of the bottom, and from right to left, will fully ſecure the combs, upon any neceſſary removal or inverſion.

277. For as the Bees generally build their combs in parallel lines to the door-way, the ſpleet or ſtick being placed at right angles, or the reverſe of the combs, each of theſe will neceſſarily reſt, and be faſtened by the Bees to the ſpleet, thereby rendering any more ſuperfluous. When the combs are to be taken out, a notch is to be cut in each comb as far as the ſpleet, which may be then pulled up, and the combs taken out entire.

278. During the whole ſeaſon of ſwarming the Bees ſhould be carefully watched. This ſeaſon is ſometimes very long. In the year 1779 my Bees were obliged to be watched from the beginning of April until the end of July; but this is ſeldom the caſe: however ſo long as any Stocks have not ſwarmed, they certainly require to be attended to. In ſome years a month will be long enough. Thoſe who keep half a dozen Stocks or more may get poor children to watch them for a

trifling reward; and thus at a ſmall expence ſerve themſelves and a poor family at the ſame time. In the *longeſt* ſeaſon it cannot *exceed* half a guinea. Suppoſing only one Swarm to be ſaved by this means, it will pay the whole; but in general the expence will not be near ſo much. A conſtant watch however ought moſt certainly to be kept: For Swarms very frequently riſe, as has been obſerved, without ſhewing the leaſt ſymptom of their intention. Many Swarms I have loſt formerly by not attending to the profitable doctrine of conſtant watchfulneſs: for as Swarms often riſe ſuddenly, if a perſon be abſent but five minutes the Swarm may be gone.

279. The ſwarming hours are generally reckoned to be from nine o'clock to two. This is very wrong, for Swarms frequently riſe as early as eight, and as late as four. Whoever therefore truſts to fewer hours will often ſuſtain a conſiderable loſs; as will alſo thoſe who truſt to their not ſwarming in indifferent weather: I myſelf have had, and know many others who have alſo had Swarms riſe in what we may call cold weather in May, and in miſling clouded days. The Bees are a people ſo uncertain in their motions, that a conſtant eye muſt be kept upon them in all weathers, except indeed a hard ſhower of rain, hail, or ſnow. Let us not therefore to ſave a few ſhillings, run the hazard of loſing pounds. No one ought to expect to be ſuc-

ceſsful with Bees, any more than with pigs or poultry, which profit but little without care and attendance.

280. The diſadvantages of the Bees *lying-out*, have been already treated of, (244) we now proceed to point out the only remedy againſt this vicious habit that can turn to any profit.

281. When a Stock is not wanted to ſwarm, it ſhould be *raiſed* as ſoon as the Bees begin to work briſkly, ſtopping the bottom door-way until full ſwarming-time; for if they are not raiſed until they ſeem to want it, the doing thereof will often occaſion them to Swarm; on the contrary, when a well repleniſhed Stock is intended to ſwarm, but the Bees begin to aſſemble in idleneſs, they may be permitted to do ſo four or five days, but no longer.

282. This idle habit ſhould be broken by raiſing the Stock, rather than ſuffered to increaſe, though ſwarming during the whole ſeaſon, ſhould be prevented by this proceeding: for frequently the diſturbance of raiſing provokes them to ſwarm in a day or two afterwards; and therefore a ſtrict look-out muſt be kept.

I once had a box Swarm, which afterwards layed out, notwithſtanding as many glaſs veſſels were ſet over them as amounted to a peck; much work being done in the glaſſes, I did not chooſe to take them off, and therefore a little box was ſcrewed on over the cluſter and door-way; and a freſh door-way made therein. They built in that box, and ſucceeded well, when taken away as ſoon as honey-gathering ceaſed. Where Bees are kept in common hives that cannot be conveniently raiſed, any convenient veſſel placed over the largeſt cluſter, and fixed as near the door-way as poſſible, will anſwer the ſame purpoſe; the beſt time to do it, is after the cloſe of the day, either by moon light, or by a candle and lantern; but at no nearer a diſtance than juſt to ſee how to perform the buſineſs.

283. But ſhould this not ſucceed, having put on a pair of gloves, and ſecured your face with a maſk, at the cloſe of evening, or rather at day-break, hold a hive, or other veſſel under the largeſt cluſter that lie out, gently puſhing the empty hive upward, that as much of the cluſter may hang in it as poſſible; then with a ſtiff wire, ſlip of tin, or thin ſtick, drawn cloſely and very gently againſt the bottom of the floor or ſtool, ſeparate the Bees therefrom, ſo as to fall into the hive underneath; or, the veſſel or hive itſelf drawn by a ſkilful hand againſt the bottom, will have the ſame effect.

284. But if they cluſter *round* the hive, and not underneath, hold the bottom edge of an empty hive, ſo as to be even, or upon a level with the ſtand; then with a bruſh or rather a wing, gently move the cluſter forward, until they fall into the hive; but if they hang about ſo inconveniently that this cannot be effected, they may be taken up by

a ſpoon and put into the hive (384). Should there be danger of ſome of the Bees falling on the ground during the operation, a cloth ſpread thereon, will receive them, and being afterwards laid over, or about the ſkirts of the hive, the ſtragglers before morning will be returned home.

285. The Bees you have taken may be returned to the Stock, which in the interim ſhould be raiſed by an ekeing, or lift, that is, two or three rounds of another hive placed under them; or, for want of theſe, by ſtones or portions of bricks laid at proper diſtances underneath. Then take the hive or veſſel that has the outliers in it to the old Stock, turn it upſide down, and ſtrike the edge forcibly upon a floor or ſtool, cloſe to the Stock; the Bees will fall out and join the family before morning; then cloſe all the openings with clay or cow dung, leaving only the uſual entrance. Thus having ſufficient room, they will either immediately begin to extend their works, or ſwarm in a day or two after. A cover ſhould be ſuſpended over them during the night; and alſo over ſuch Bees that lie out, leſt haſty ſhowers waſh them down, and deſtroy them.

286. Another method is to take the old Stock off the ſtand, raiſe it as before directed, and ſet it upon a ſtool about a foot diſtant from the ſtand. Then lay a ſmall piece of board from the Stock to the ſtand, to ſerve as a bridge. Let them remain in this ſituation all night. The noiſe of the Stock, oc-

caſioned by the removal will alarm the cluſter of idlers, who miſſing the heat and connection they before had, will preſently be in motion and anxious to find their companions; this they will ſoon do by paſſing the bridge; and now finding ample room, will be received with joy. The Stock the next evening may be ſet in its uſual place.

287. But if you want Bees to ſtrengthen a weak or backward Stock; ſtrike them out (260) at night before the Stock, and by the morning they will be incorporated; or, (and which is the beſt mode) take a bucket, pail, &c. or four or five rounds of ſtraw cut out of an old hive. On either of theſe, turn the hive of idlers upſide down, and immediately ſet the Stock over them.

To HIVE BEES *properly.*

288. I would recommend no other defence than what I uſe myſelf, and which few perſons will probably object to or think extravagant. My meaning is, to drink a cup of good ale, and to rub ſome of it over your face and hands, for as the Bees love the ſmell of this liquor, when good, it will be no ſmall recommendation to their favour. While this agreeable exhalation therefore is riſing from you, caſt away fear, for you may hive them with ſafety, provided it be done with care and proper precautions. Boldneſs and gentleneſs are now equally neceſſary, every motion muſt be deliberate, and without any hurry. Be particularly careful not to cruſh any of the

Bees, for the ſmell of their bruiſed bodies will excite the reſt to fury and vengeance. Great care is at this time peculiarly neceſſary, as without circumſpection, you may even kill the Queen herſelf, as is too often done, and which will infallibly occaſion the Swarm, though well hived, to return home.

289. There is little danger to be apprehended from the Bees when they ſwarm, becauſe at that time they have many fears and apprehenſions, and are therefore uncommonly gentle and pacific. At ſuch times I have thruſt my naked hand up into the middle of a Swarm as they hung upon a bough, without the Bees ſhewing the leaſt reſentment: which, had they been in their hives, they would not have ſuffered without the utmoſt indignation. But in bad weather, eſpecially if it be windy, they become more iraſcible, and will not ſuffer any one to be quite ſo familiar with them; a pair of gloves will then be neceſſary.

290. Some are ſo very ſimple, as either to fumigate the Bees with ſmoke, or throw water on them, from a notion of making them ſettle and become more quiet. But ſo far from anſwering this purpoſe, it deſtroys many of them, and makes the reſt ſo deſperate as not to be hived without great danger. And even when this is accompliſhed, they are ſo irritated at ſuch uncivil uſage, that they frequently riſe out of the hive, and fly quite away. Whereas, let the buſineſs be done with patience and circumſpection,

they may be hived, however badly ſituated, without any of theſe inconveniences.

291. Swarms are often divided by ſuch injudicious management; part of them returning home, while thoſe that remain, being ſo much diminiſhed, form but a feeble Swarm, and of little value.

292. It ſometimes happens that a Swarm divides while hovering in the Air, and ſome fall to the ground. You muſt examine in this caſe with great care, for if you find any, it is very likely the young Queen is among them; if ſhe is, place her *upon* the empty hive, and take it as near as you can to the Bees ſwarming: if only a few ſee her, they will give notice to all the reſt, and preſently ſettle upon the hive, over this another may be placed, into which they will aſcend, without further trouble. But if the Queen be not found, the Bees, though well hived, will not remain but either fly quite away or go back to the Mother Stock, or endeavour to gain admiſſion into ſome of the other Stocks, thereby occaſioning tumult and ſlaughter.

293. It has been an ancient cuſtom to make a tinking noiſe upon a pan, kettle, or the like, when a Swarm riſes, as being thought conducive to make them ſettle the ſooner, and prevent their flying away. This has been objected to as of no uſe. I once thought ſo, and thereby loſt ſeveral Swarms. Many times I have forebore tinkling until they were almoſt out of my premiſes; but on ſtriking up a ſerenade upon a large watering

pot, they have always ſettled; and I have never loſt a Swarm, ſince I have uſed this method, or had them ſettle at any great diſtance.

294. I have known of ſeveral Swarms flying over large commons, that merely by the tinkling of a key upon a fork, have been immediately ſtruck with attention, and their flight being ſtopped, have ſettled on the ground very near the ruſtic muſician.

295. The reaſon may be the ſame, as that which induces Bees to return precipitately to their hives at the approach of a thunder ſtorm. Tinkling has the ſame effect, as far at leaſt as the ſound extends; the exploſion of fire-arms produces the ſame, but in a much ſhorter ſpace of time; as it will cauſe them to ſettle almoſt inſtantly; and conſequently within due bounds, provided the exploſion be made on that ſide to which they are ſtraying too far.

Not that the Bees are fond of muſic as ſome fondly imagine, for my Bees have often had variety of *that* near their hives, without taking the leaſt notice of it.

296. As the practice of tinkling has been of a very long ſtanding, and is no ways hurtful, I ſee no good reaſon for its diſuſe; beſides, it is abſolutely neceſſary in another point of view, viz. to aſcertain your property, which otherwiſe might be diſputed, if the Swarm ſhould ſettle in another perſon's premiſes. For the tinkling ſecures a *legal right* to follow your Swarm upon another perſon's

grounds in order to hive them; making good any damage you do thereby.

297. Particular care muſt be taken, not to *begin* tinkling until the Swarm is all out, leſt you intimidate the others, and prevent their riſing.

298. If notwithſtanding your noiſe, they ſeem not diſpoſed to ſettle, or they fly too high, throwing up ſand or duſt among them, will cauſe them to keep within bounds, and the ſooner deſcend. As ſoon as ever they begin to ſettle, immediately ceaſe all noiſe, that thoſe on the wing may hear the ſounds of thoſe that are fixing, and be allured to join them.

Whiſtling or any other noiſe is then highly improper; for the more ſilence, the ſooner they cluſter. For when once a part is fixed, there is no danger of the reſt not following.

299. Before Swarms are put into one of my hives the barred top ſhould have a hole made at each end of the middle bar, to admit a four-penny brad, long ſlender nail, or peg, to paſs through into the edge of the hive, in order to keep it firm in its place; the ſtraw top muſt be faſtened on; this is beſt done by making four loops with a ſtrong pack-thread, drawn through the hive, near the top edge, at equal diſtances, and long enough to meet at top within three or four inches, and drawn together by another piece of pack-thread, and faſtened by a knot upon the

top. If a box be uſed, the top muſt be ſcrewed on.

300. If a Swarm or Caſt is riſing from a Stock, contrary to your wiſh, immediately with a handkerchief, or the like, ſtop the door-way for ſome time; this will baulk and perhaps deter them from ſwarming afterwards. But if the young Queen roſe with the few that firſt iſſued, theſe will not return again.

301. When a Swarm is upon the wing, have an eye to your other Stocks, and if any are preparing to riſe, ſtop them, until the Swarm is ſettled. Then, if another riſes, and attempts to unite with the firſt; cover theſe immediately with a cloth, until the other is alſo fixed; and ſo for any others. For if double Swarms be hived together, there will be a terrible ſlaughter, until one of the Queens be killed; or ſometimes the whole Swarm will quit the hive, and fly quite away.

302. Although Swarms will often riſe at the very inſtant when the greateſt buſineſs is carrying on; yet, when it is a favourable day, and they are obſerved not to work, and but little noiſe in the hive, a Swarm will ſurely take wing in an hour or two afterwards. Sometimes, alſo, there is a ſudden throng of Bees at the entrance, making loud alarms, as though going to ſwarm, when it is only the expreſſion of joy for the appearance of a large delivery of young at once.

303. If a Swarm riſes and returns back again to the Stock, and you perceive them before many are got into the hive, immediately take the old Stock away, and ſet an empty hive in its place; by this manœuvre, the Swarm will be deceived, and ſettle quietly therein. It ſhould then be placed at the moſt diſtant part of the Apiary, and the Mother Stock ſet in its own place again. But if the Swarm ſhould be tumultuous and uneaſy after it is in, ſet the old Stock cloſe to them, and they will ſoon be re-united to them again. For in this caſe, it is plain, they either had no Queen with them, or had loſt her in their flight. Though there are other cauſes of a Swarm's returning, as too much wind, clouds portending ing ſtorms of thunder and ſhowers.

304. The form in which a Swarm hangs from a bough, is that of an inverted cone, big at the top, and tapering to the bottom; the point being only a ſingle Bee; they adhere together in this manner, by hooking themſelves to each other by their feet. But at other times, when the plant or tree will not admit of their being thus ſuſpended; they ſpread round the body of a tree or branch, (fig. 5.) or upon a hedge, buſh, ſhrub, &c. in a variety of directions, often very inconvenient for hiving.

305. Low trees near an Apiary are very uſeful, for they attract the Swarms to ſettle on them, which are thereby more eaſily hived.

For Swarms will ſometimes fix of their own accord near the Apiary, though no notice had been taken of their riſing. But ſuch inſtances are too precarious to be truſted to; and they will much oftener fly away without cluſtering at all. A branch of a tree, or a hive, fixed upon a long pole, and lifted up among a Swarm, when in the air, has inticed them to ſettle thereon.

306. No time ſhould be loſt to hive them as ſoon as cluſtered; for the longer they hang, the more irritable they become, and the more unwilling they will be to hive. For when once fixed, they ſend out ſcouts to bring tidings of a proper habitation, and no ſooner do theſe return, and touch the cluſter, but there is a general ſhake of the wings; after this, they preſently unknit and depart, unleſs they be immediately hived, and then it is a chance if they will ſtay.

307. A large cloth or apron, and a hive floor or other board will be uſeful in the hiving; ſpread the cloth upon the ground as nearly under the cluſter as poſſible; on that, place the floor, and a ſtick about an inch thick laid acroſs; ſo that when the hive is placed thereon, there may be ample room for the ſtruggling multitude to enter the more freely and ſooner in.

308. Or a Swarm may be ſhook off a branch or ſhrub, into a cloth, properly held under by an aſſiſtant, and the cloth with the Bees therein, immediately laid on the ground, then placing a hive over the Bees,

ſupporting one edge, a little raiſed, by a ſtone, or ſomething convenient, ſo that no Bees be cruſhed, and they will ſoon aſcend up into the hive without any further operation, but that of ſcreening them from the rays of the Sun.

309. If a Swarm hangs to a bough, or any thing that will admit of the hives ſliding under them, firſt cut off, in the moſt gentle manner, any twigs that may be in the way; then with your left hand preſs the inverted hive upwards, to incloſe as much of the cluſter as poſſible, without diſturbing the Bees, until with your right hand you give the bough a ſudden and ſmart ſhake; this will cauſe moſt of the cluſter to fall into the hive; among whom, in general, will be the Queen. Keep the hive in your arm as it is, until you have got to the board or cloth; (307) then gently turn it upſide down; one edge upon the board, and the other upon the ſtick that lays acroſs; any Bees that have tumbled out, as well as thoſe on the wing, hearing the buz in the hive, will ſoon join them. With a few twigs, diſturb thoſe that attempt to ſettle again, and they will ſoon deſiſt. But uſe no nettles, or water, which ſerves only to inrage and injure the Bees.

310. Cover the hive with a cloth, boughs, or any thing proper to keep off the too piercing rays of the Sun; for otherwiſe the Bees finding their new habitation too hot, will be wiſe enough to quit it.

311. If it ſhould happen to be more convenient to hold a cloth or large apronunder the Bees, than a hive to ſhake them into, let the former method be taken, and gathering up the cloth by the corners, very gently and tenderly bring it down, and manage as directod (307). To avoid repetitions; *either* a cloth or hive may be uſed, as ſhall appear moſt convenient, in any of the operations hereafter directed. Let the hive remain in this ſtate until the evening, and then (taking away the ſtick) remove it to its appointed place. If taken away before, the ſtragglers will be loſt.

But if it happens to be in a place inconvenient or improper to leave the Swarm in until night, as ſoon as ever the Bees are wholly got in, or nearly ſo, it muſt be covered with a cloth, and taken to its deſtined place at once: the ſtragglers that are left will return to the mother Stock.

312. It will alſo be proper to adopt this method when a Swarm is ſo very large as to impoveriſh the Stock; for by taking the hive away, as ſoon as a ſufficient number are got in, the reſt (ſometimes a great number) will return to their former abode.

313. Should a Swarm ſettle ſo untowardly, that a hive cannot be conveniently held under them, a light baſket will anſwer the purpoſe as well: the Bees being ſhaken into the baſket, ſet it upon its bottom on the ground, then a hive being placed over it,

they will quit the baſket, and fix in the hive.

314. Swarms often cluſter in trees much too high to be come at without the aſſiſtance of a ladder, ſteps, table, or the like, and ſometimes at the extremity of a ſmall bough, at too great a diſtance to be reached with the hive in your hand. In this caſe, after placing the hive in readineſs under the tree; and having prepared a ſharp knife, and a ſaw, aſcend the ladder, and gently cut away all the ſmall twigs and branches that ſurround the cluſter, and examine if the bough on which it hangs can be cut through with a knife, as this will diſturb the Bees much leſs than the action of a ſaw. Keep the branch ſteady with one hand while you ſever it with the other, or rather it ſhould be held by an aſſiſtant, and as ſoon as cut through, be brought gently down, taking great care that the Bees be not touched by any of the other branches. Then lay the bough with the Bees on it, very gently on the cloth or board, and ſet the hive over it. Before the evening the Bees will be fixed to the top of the hive, having quitted the bough, which may now be taken away, and the hive put in its intended place.

315. But ſhould it be impracticable, or hurtful to a tree, to cut off a branch, a baſket or hive may be tied bottom upwards upon a long fork, rake, or pole, and held under the Swarm while another perſon ſhakes the branch, either with his hands or ſome

other inſtrument, ſo as to get as many as poſſible into the hive or baſket; after which, the remainder are to be diſlodged by a long ſtick, with ſmall twigs tied to the end. Or they may be diſlodged by twigs tied to the end of a long pole, until they ſettle more conveniently to be hived. At the ſame time the proper muſic, and fire arms, charged with powder only, muſt be in readineſs, leſt the Swarm take wing again, and now affronted with your treatment fly quite away.

It will be highly neceſſary in theſe troubleſome operations to defend your face and hands. (73, 76.)

(316. Another very difficult caſe is, when they ſettle at a great height, round a branch of a tree not flexible enough to be ſhaken; the moſt eaſy method of hiving them is, to ſet a hive upon a board or floor, whereon are two pieces of ſticks to raiſe the front edge of the hive about an inch, take this up a ladder (placed as cloſe to the Bees as poſſible) and reſt the board or its edge on the branch, as near the Bees as can be without hurting them. Then ſuſpend or faſten the hive with cords to the other branches of the tree, or ladder, in the ſafeſt and beſt manner that circumſtances will allow of. This done, with a ſpoon, gently take ſome of the Bees from the cluſter, and turn them out of the ſpoon at the door-way of the hive, this repeat ſeveral times, and they will crawl into the hive. This me-

thod may be continued as long as the other Bees ſhew no great reſentment, or until you have got about a quart into the hive. Leave them a little while; the noiſe of thoſe in the hive will incite the others to march therein alſo, and in about an hour the whole Swarm will have entered. But if inſtead of this, they ſeem not diſpoſed to quit the branch, take more of them away by the ſpoon, at intervals, until the others begin to run into the hives themſelves.

By patiently proceeding thus, there is far leſs danger, damage, and trouble, than by thoſe irritating and violent means generally employed in theſe caſes.

317. When Swarms hang too low to admit the paſſing a hive underneath, a cloth may be drawn under them, and a ſtick laid thereon; then ſhake the Bees down, and gradually withdraw the cloth far enough to allow the placing the hive over it. If there be any Bees already on the ground, they will ſoon hear the noiſe of the multitude, and join them. If not, the hive ſhould be placed near them; or with a bruſh or wing, move the Bees nearer the hives, as ſhall appear moſt convenient.

318. When they ſettle in a hedge, fix a hive over them, either upon forked ſticks, or any other contrivance. But firſt ſprinkle the inſide top of the hive with ale and ſugar; but *only* at the top, becauſe it is to that part we want to entice them. Wait ſome time, and if this ſhould not ſucceed, intro-

duce a hive *underneath* them, as far as poſſible, cutting away ſuch ſprigs and branches as may obſtruct its paſſage; then ſhaking the buſh or hedge, cauſe as many as poſſible to fall into the hive, and continue ſo to do until they are wearied of returning to the hedge, or have gradually joined thoſe in the hive, which they will do by this management in a little time. Lay two ſticks acroſs the hive, and ſet another over it, and by night thoſe that are upon the ground, and on the outſide of the hive, will be all gone in, and collected with the reſt now aſcended in the upper hive, provided the Queen be among them, otherwiſe ſhe muſt be looked for among thoſe upon the ground or about the hive.

319. Should they cluſter round the body, or leading branches of a tree, apply the edge of the hive cloſe to the body, a little below the ſpread of the Bees, and where there is the greateſt bunch or cluſter; gently preſs the hive upwards, and with a ſmall ſtick, force down as many Bees as you can into the hive, but be ſure not to hurt any of them; then removing the hive to other *parts* that have the largeſt cluſters, do the ſame there; it is very probable the Queen will be among ſome of theſe. The hive muſt now be placed as near as poſſible to the tree, and the reſt of the Bees will join their fellows, provided they are ſo diſturbed as to prevent their ſettling about the tree again. As this is a very difficult caſe, the

Bees will be unavoidably irritated, and therefore the face and hands ſhould be properly ſecured.

Though theſe methods will undoubtedly ſucceed, yet I have found the following much eaſier and ſafer, when the ſituation is not too high.

320. Firſt, procure a ſufficient number of tables, ſtools, or caſks, that they may be ſet on each other ſo as to be of equal height with the cluſter of Bees, or two ladders muſt be ſo placed as to admit a board from one to the other, ſufficient to hold a bee-hive. This being done, hold the hive bottom upwards, and with a ſpoon gently take up as many as you can at a time, from the largeſt cluſter, and put them carefully into the hive, until there be a quart or more, if the Bees will let you do it patiently; then turn the hive upon its bottom on the board or floor, already prepared; the edge of the hives next the tree muſt be kept a little raiſed, for the eaſier admiſſion of the concourſe of Bees that yet remain on the tree. When caſks or tables are uſed, the ſtage formed by them with the hive upon it, is to be gently moved towards the tree, ſo that the edge of the hive-floor may touch the Bees; but if this ſhould be inconvenient, a thin piece of board may be laid from the hive to the tree, as a bridge for the Bees to paſs over; for the noiſe of thoſe in the hive, will attract the notice of ſuch as are on the tree, and you will preſently ſee them begin to diſlodge and paſs the bridge

to their companions. This will be the ſooner effected, if you gently ſtroke down thoſe neareſt the hive with a ſtick, or rather take from the largeſt cluſter ſpoonfuls at a time, and put them upon the bridge near the entrance of the hive; for they will then go directly in, and when the greater number have entered, there is no danger but the reſt will follow.

321. The uſual way of bruſhing Bees into a hive enrages them moſt highly; this, however, is not all the miſchief, for many are killed in the operation, and ſometimes the Queen herſelf; in which caſe, the Swarm, even after having been hived, will fly away: nor will the Apiator himſelf be ſafe, unleſs very well defended. All theſe inconveniencies are avoided by the gentle method juſt recommended; and to a lover of Bees, is as agreeable an amuſement as hunting or angling to others: I perform it without even a pair of gloves, unleſs in a bad day.

322. Authors direct, as a general rule, that Swarms ſhould always remain near the place where they ſettled, until the evening, as otherwiſe thoſe Bees that have not ſettled and are hovering about, not knowing where their companions are placed, will return to the old Stock, and will be treated with the ſame ſeverity as ſtrangers. In the many obſervations I have made, I can aſſert, that ſuch conſequence never followed, but that they were received as kindly as though they had never parted.

323. When Bees ſettle in a hollow on the ſide of a tree or ſtub, clap the bottom of the hive ſo cloſe againſt it, that not a Bee can eſcape: let an aſſiſtant hold it faſt, and alſo tie a cloth round the edge, or with clay or the like ſtop every opening: being thus well ſecured, with a hammer or great ſtone, beat round about the hollow, making the greateſt noiſe you can, which in a ſhort time will ſo terrify the Bees, that for peace ſake they will be induced to enter the hive: now and then ceaſe the noiſe, and applying your ear to the hive, you will know by the buz when the greater part are in: you may then ſet the hive down, and diſturb thoſe that remain in the hole with ſmall twigs, which at length will ſo weary them, as to make them enter the hive. Then ſtop the hole with weeds, or any thing at hand, and your work is done.

324. Swarms will frequently make a hollow tree their habitation. To diſlodge them make a large hole with a chiſſel, hatchet, or other ſuitable inſtrument, as near as poſſible to the upper part of the hollow; for, if there be room enough, they will lie always above the hole they go in at: place the edge of the hive cloſe to the hole, and forceably ſtriking about that part of the tree where the Bees are, give them as much diſturbance as poſſible; alarmed and terrified at the ſtrokes, they will preſently iſſue out through the hole, and very likely ſettle in the hive; but if not, on the branches of the tree, or on ſome other place, that may be convenient for hiving

them. After being hived, they ſhould be placed near the tree they came from, to receive the ſtragglers.

325. But if they lie below the hole, they enter in at, make the opening beneath them; and take care that the upper hole, by which the Bees are to iſſue out, be the largeſt: ſometimes however, all theſe methods prove ineffectual. We muſt then have recourſe to fumigation; this is done by placing old rags, damp ſtraw, or any thing that will make much ſmoke, underneath the Bees, and ſetting fire to it, at the ſame time diſturbing them as much as poſſible by violently ſtriking the tree; this will generally cauſe them to fly out and ſettle elſewhere.

326. The ſame method muſt be purſued if any Bees remain afterwards in the hollows, or places of lodgment, to force them out; and to prevent their return, the holes ſhould be ſtopped with nettles or other weeds.

327. Should they ſettle under the roof, or in any vacancies of a houſe or other building, a continued noiſe, beating, or drumming againſt the part they are lodged in, will cauſe them to quit it; eſpecially if the place of entrance be very much enlarged.

If this alarm ſhould not ſucceed, plenty of ſmoke may be conveyed to them by means of a funnel, which will moſt likely drive them out. But where ſmoke cannot eaſily be introduced, water poured over them by a funnel, or ſquirted on them by a ſyringe, will ſo affect them that the combs and Bees may be taken away by the hands, which however ſhould be defended by gloves.

328. But in all theſe caſes it ſhould be obſerved, that the longer they have been ſettled, the greater will be the difficulty of diſlodging them, eſpecially if they have been ſome days, and have made combs; for they will then die, rather than relinquiſh them.

329. Therefore, where none of theſe operations take effect, the only way left (except that of deſtroying the Bees by the fumes of brimſtone) is, for the Apiator to be armed cap-a-pee (73). He may then boldly break an opening into the building or wall, ſufficient to put in his arm, and to take the combs away one by one; then having an empty hive or *two* ready, with ſeveral ſticks half an inch thick, place the combs in the hives, and between every two combs put two pieces of ſticks to keep them at a proper diſtance, ſo as not to cruſh the Bees that may be hanging upon them. If there be a comb containing young, it ſhould be placed in the middle. Then ſetting the hive as near as poſſible to the place of lodgment, the other Bees will be enticed to quit their old reſidence, and quietly enter this new habitation. If the next day they work kindly, all is well: otherwiſe drive the Bees out (372) and take away the combs and honey, eſpecially if it be at the latter end of the ſeaſon.

330. When Swarms come into a room, as ſoon as they are all nearly in, cloſe the windows and doors, that none may eſcape; let

them remain until they have cluſtered, then cover them with the hive, and gently draw it along the wall or ceiling, to diſengage them from it; afterwards take the hive, bottom upwards from the cieling, and ſet it upon its bottom on the floor, with one edge a little raiſed up by a ſtick. Before night the reſt of the Bees will go down and join their companions: they will do this the ſooner if the room be ſo darkened that they may *think* night is coming on.

331. When ſtraggling Bees come into a room, if the upper ſaſh be pulled down, they will preſently go out again; but where windows are not ſo conſtructed, the Bees ſhould be gently bruſhed down to that part which does open, or otherwiſe they will beat themſelves to death againſt the glaſs, as they always aſcend to the upper part, where the greateſt light is.

332. In many buildings, as well as in hollow trees, there have been lodgements of Bees for a long ſucceſſion of years, without either hurt or profit to the owners. Swarms riſing from theſe might be watched and hived as other Swarms are; and were a hive with honey-combs in it, eſpecially with a brood comb, ſet in ſwarming-time over the opening or paſſage, by which they enter, it would be a means of enticing a Swarm to ſettle there. A hive, ſo prepared, and placed near them, will have the ſame effect.

333. Stray Swarms are frequently ſeen in their flight over fields and commons: theſe may be enticed to ſettle, by tinkling with a

key upon a fork, by whiſtling, or by any other ſimilar noiſe.

In ſuch caſes it will ſometimes be a long while before a hive can be procured, and in the interim the Bees may reaſſume their flight: to prevent which, as ſoon as they are ſettled, throw your handkerchief over them, and tie it by the corners ſo as to incloſe them; then cut off that part of the bough or ſprig, to which they hang, with as little diſturbance as poſſible, and you may carry them in this manner ſeveral miles with great eaſe and ſafety. But ſhould they ſettle on the ground, ſpread your handkerchief, cloſe by them, and with a whiſp of graſs or a ſmall twig gently ſhove them upon the handkerchief; or if your hat be laid over them, it is likely they will aſcend therein.

When you have procured a hive, and have laid the branch acroſs a pail or pan, and two other ſticks acroſs, untie the handkerchief, and ſet the hive over the bough, reſting upon the croſs ſticks; let it ſtand until night, and all the Bees will have entered into the hive: but if you have them in a handkerchief, without any branch, lay the handkerchief on the ground, untie it, and place the hive over it; the Bees will ſoon aſcend therein.

334. There have been many inſtances of a Swarm ſettling upon a perſon's head (67). In this caſe, if any reſiſtance be made, it may be attended with fatal conſequences; but if you remain quiet and paſſive, without giving the Bees any affront or diſturbance, not one will offer to ſting you.

335. As ſoon as you perceive a Swarm diſpoſed to ſettle on you, take off your hat, and carefully cover your head and face with your handkerchief; but if this cannot be done, place your hands hollow over your mouth, noſe, and eyes, and then ſuffer them to ſettle upon you quietly, calling at the ſame time for aſſiſtance: or you may leiſurely walk with the Bees upon your head, with as much ſafety and confidence as Mr. Wildman himſelf, until you meet ſome one to aſſiſt you: let him take a prepared hive, and hold it over your head, and the Bees will very likely ſoon begin to aſcend therein; as ſoon as this is perceived the hive muſt be held a little higher, the better to withdraw the Bees from the head; this will be ſooner effected if you go into a room conſiderably darkened. But ſhould this method not ſucceed, the Bees may be taken off by a ſpoonful at a time, and put into the hive, until the greater part be taken off; then holding the edge of the hive ſo as to touch thoſe that remain, they will ſoon crawl to thoſe in the hive: or, by giving your head a violent and ſudden ſhake over a hive or table, the greater part will fall off, probably the Queen, then walking to ſome diſtance, thoſe that remain, miſſing the Queen, will ſoon diſlodge in ſearch of her; but, if inſtead of this, they remain quiet, and the other Bees return to ſettle on you, it is a ſign you have ſtill the Queen about you; whom, however, at the next effort, you will probably ſhake off; the

few then remaining, may eaſily be taken off by a ſpoon. Sometimes alſo a great ſmoke made behind a perſon, ſo as to blow over him, will readily diſlodge them.

336. Should a Swarm attempt to fix upon or enter another Stock, cover the hive immediately with a cloth, and ſhut the door-way until they be ſettled and quiet; then ſet a hive over them, and in about a quarter of an hour open the Stock door-way, and by the four corners of the cloth lift the hive up and carry it to the place deſigned for it. Early the next morning the hive may be taken up, and the cloth removed; but if they have already made a lodgment upon the hive, ſtop up the door-way, and hold an empty hive, over the greateſt cluſter, and perhaps they will aſcend; if not, take a ſpoon, and gently put a quart or two of the Bees into the empty hive, then ſet it over the reſt, and they will follow; as ſoon as they appear to do ſo, open the Stock door-way. The Swarm ſhould be taken away as ſoon as they have done aſcending.

337. When two Swarms riſe together and fight, the throwing of duſt or ſand among them will generally appeaſe the ſtrife, and ſeparate them; or, they may be terrified into the ceſſation of hoſtilities by the exploſion of a fowling-piece.

338. Should a Swarm fix very near the ſpot where another had been hived a day or two before, it will be neceſſary to place it four or five yards diſtance, or elſe many of the firſt hived Swarm returning to their

alighting place, will repair to the new comers, and be killed. If a Swarm be too ſmall, the next that riſes, if not large, ſhould by all means be added to it, which will make it a very good Stock.

339. It often happens, that two or three Princeſſes go out with a Swarm, and ſettle in ſo many cluſters: when one cluſter is very large, and the others ſmall, hive them all ſeparately; at duſk ſpread a cloth upon the ground, with a ſtick acroſs, take the hives with the ſmaller cluſters, beat the Bees out upon the cloth, and then ſet the hive with the large cluſerin it over them; about two hours after this, lift them, cloth and all, upon a proper ſtand, and before morning they will be united with little or no ſlaughter; eſpecially, if the ſmall cluſters have been ſprinkled over with ale and ſugar: let them remain in this ſituation until next night, when the cloth may be taken away. Another method is, about an hour after the ſmall cluſters are hived, to beat them out upon a cloth, and take the Princeſſes from them (384), and immediately to ſet the hive with the large cluſter over them; or they may be firſt ſtupified (389), and then their Princeſſes taken from them; this will produce a firm union without any contention.

340. But it is not *always* that the Swarm ſeparates, although accompanied with two or more young Queens, but will all ſettle together: however, as ſoon as they are hived great commotions and much ſlaughter will enſue before the Bees can decide which Princeſs,

Princeſs ſhall reign. If the competition be nearly equal, and victory long in ſuſpence, all the Bees will quit the hive, in order to decide it more commodiouſly in the open air: they will then either unite or ſeparate into diſtinct Swarms: in this laſt caſe to re-hive them all together, will be of no uſe, but may occaſion the deſtruction of the whole: they muſt therefore be hived ſeparately, and treated as Caſts (366). But if they continue fighting in the hive until the next morning, it will be better perhaps to ſtrike them all out of it; and they will then either ſeparate or return to the mother Stock.

341. In theſe caſes open hives have a great advantage; for by ſetting another hive over them, and leaving the door-ways open, the Bees will ſeparate without quarrelling. The next night ſtop the upper entrance, and the Queen that has the feweſt partiſans will be expelled without much ſtrife.

342. It does not always happen that they quarrel directly, though there be two Princeſſes; for ſometimes they continue undetermined in their choice two or three days; but all this while they will be very reſtleſs and confuſed, nor attempt to work, until one be depoſed and expelled, or ſlain.

343. All Swarms, if the weather be fair, will begin to work almoſt as ſoon as hived; but if the firſt day be foul, ſo as to prevent their going abroad, it diſcourages them ſo much, that on the ſecond, though fine, they will ſcarcely look out; but when the third

day proves unfair it ſometimes makes them ſo ſulky as to chooſe rather to die than to ſeek for food.

344. Butler ſays they will live five or ſix days without honey, and when nearly ſtarved they ſtring down, hanging by each others legs like ropes: this is a certain ſign of approaching death, if not directly relieved (733).

345. When all the Swarms are gone, if any young Princeſſes be left, they are generally killed two or three days after, and may be found dead about the hives; though they are ſometimes reſpited until the execution of the Drones.

CHAPTER XII.

Of SWARMING BEES ARTIFICIALLY. *Of* CATCHING *the* QUEEN; *and Method of* UNITING SWARMS *and* STOCKS.

346. IT has been already noticed of what great importance the Queen is to the ſtrength, ſupport, and perpetuity of every Stock or Swarm of Bees. A *truth* the antients were in ſome degree acquainted with; but they ſuppoſed the principal Bee to be a *King*.

347. Xenophon, * who flouriſhed about 2000 years ago, ſeems the moſt ancient writer who has taken notice of this peculiarity. His words are very remarkable: "There "is one particular Bee in every Swarm (or Stock) a leader of the reſt, as one they willingly obey; where that remains, not one will *thence* depart; that removed, not one will ſtay behind, ſo ſtrong is the affection they are inſpired with to be governed by *it*."

He ſeems doubtful of the gender, by characterizing *it* in the neuter.

348. The immortal Virgil ſweetly ſung on this delightful ſubject above 1700 years ſince. But with reſpect to any method of taming the Bees, or captivating the Queen, Virgil himſelf is ſilent. Columella, however, ſeems to have been acquanted with the ſecret, by directing one of the Queens to be killed in the union of Caſts.

349. But the firſt account of captivating the Queen at will, is given us by father Labat; † who mentions, that he met with a man who ſeemed covered over with Bees, his cap particularly was ſo covered as to reſemble thoſe natural Swarms that ſettle on a tree: he was ordered to take it off; the Bees then placed themſelves on his ſhoulder, his head, and his hands, without ſtinging him or any of the bye-ſtanders.

350. In

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* Cyropedia.

† Labat's Travels.

350. In like manner Swammerdam ſecured the Mother Bee of a Swarm, by tying a ſmall bit of thread to one of her legs, and then faſtening it to a long pole, the whole Swarm immediately aſſembled round the end of the pole, to cover the Mother Bee, and might be carried wherever the bearer pleaſed. Here we have the method of fixing Swarms; but from neither of theſe gentleman can we learn how to obtain the Queen.

351. Sir George Wheeler * indeed, lets us into the ſecret, as told him by a Spaniſh prieſt, who ſaid, he had caught the Queen with a *fly-catch*, and then cutting her wings, had obliged her to remain at home; but it may be doubted whether this be not a genteel evaſion rather than an explanation: a hive cannot be turned up, and a fly-catch thruſt therein to intangle the Queen. And to watch her going out, which is very ſeldom, or her return, requires more than the leiſure and patience even of a prieſt.

352. It is ſurpriſing that Butler, who knew how to ſtupify the Bees with punk or mully puff, ſhould not proceed one ſtep further, and make uſe of it, in order to take the Queen, and manage the Bees at will: and it is ſtill more ſurpriſing, that the ſagacious Reaumur, who appears to have read Butler, ſhould not have taken the *hint* of the narcotic fume; but was conſtrained to immerge the Bees in water, to

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* Wheeler's Journey into Greece.

obtain the Queen. The Rev. Mr. Thorley,* profited by the hint of Butler, and made uſe of it for the union of Stocks.

353. But Dr. Warder, § ſo long ago as 1712, gives a particular detail of a method of performing this ſeemingly myſterious buſineſs with eaſe and pleaſure, and without fumigation or immerſion, as to Swarms or Caſts. Here he ſtopped. For the information how to catch the Queen of a Stock we are obliged to the ingenuity of Mr. Thomas Wildman.

354. This gentleman's extraordinary performance with Bees, attracted the notice of the curious few, as well as of the public; but however advantageous they may have been to himſelf, I fear they will be found of little utility to the world. Expectations were raiſed very high, and the moſt ſanguine hopes conceived of the great increaſe of profit likely to ariſe from his mode of management.

355. Nor indeed ſhould we have been diſappointed, had the method of *Artificial Swarming*, which he deſcribes page (133), ¶ *(allowing for a few alterations)* been found as practicable as it was expected to be. His words are, "If an old hive is ſo full of Bees, that "they reſt in the night under the board, and

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* Thorley's Enquiry. &c.

§ The True Amazons.

¶ Management of Bees, 2d Edition.

" ſhew no diſpoſition to ſwarm, * turn the " hive bottom up, give it ſome ſlight ſtrokes " on the ſides, ſo as to alarm the Bees; they " will immediately run to the extremities " of their combs: if you look attentively to " the middle of the hive, you will there " perceive the Queen among the foremoſt, † " ſeize her between the fore-finger and " thumb, and confine her in your hand " until moſt part of the Bees take wing ‡; " let her then go, § the Bees will ſoon join " her, and ſettle on ſome branch of a " tree. Put them into an empty hive; put " the old Stock in its place, || that the Bees " which had been out in the fields might " enter in at their return; and having re- " mained an hour or ſo, it is then put on an- " other ſtand near, or next their own: the " hive having now what may be called a " Swarm in it, is then to be placed on the " ſtand of the old Stock, and if the Bees in " both work regularly, carrying loads, all is " well. This backwardneſs to ſwarm may " be

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* This may be the caſe, and yet not be in a proper *condition* to ſwarm for two or three weeks after, for want of Drones or a Princeſs.

† I never found it ſo.

‡ Some may, but the main body will remain even though no young Queen be left in the hive.

§ Rather cut her wings, and fix her on ſomething in ſight of the Swarm, and which ſhall be at the ſame time moſt convenient for hiving them.

|| Rather at the fartheſt part of the Apiary or there will be abundance of miſtakes and Quarrels.

"be owing to their want of a Queen to lead "them forth; and the old Queen is loth to "go until a young one is bred;* yet if a royal "cell contains a young Queen, the Bees in "both hives will thrive; as thoſe in an old "Stock will go on in expectation of the "young Queen's coming forth."

356. "This ſeparation ſhould not in *pru-* "*dence* be attempted, unleſs you have a "Queen in reſerve;† for if the Bees in the "old Stock, when placed on their ſtand are "in an uproar, there is no Queen, nor proſ- "pect of a Queen among them; and in this "caſe their own Queen ſhould be reſtored to "them, and the reſerved Queen be put to "the Swarm; or the Bees in the empty "hive, which ſhould then be carried to the "diſtance of half a mile, ‡ and remain there "for a few days, until they have made ſome "works, and may then be brought back to "their former ſtation.

"Care ſhould be taken that the number of "Bees ſeparated from the old Stock, be ſuffi- "ient in number to make a Swarm; on this "account it is *perhaps* better to uſe the fol- "lowing method.§ A ſufficient number of

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* Conſequently this operation will be labour loſt.

† Aye! but Mr. Wildman has not informed us where or how to obtain this ſpare Queen. I doubt we may ruin ſome other Stocks in obtaining one.

‡ This muſt certainly be very inconvenient, trouble-ſome, and hazardous.

§ There is no occaſion for *perhaps*; for moſt *ſurely* it cannot be done by the former.

"Bees ſhould be taken out of the Stock, in "the manner that ſhall be hereafter directed, "and put in an empty hive.* The eye will "here judge of their numbers, when one "half, or a ſufficient number, is got into "the empty hive, it ſhould be carried to "ſome diſtance. The ſilence in either hive "will ſoon indicate where the Queen is. "It would be eligible that their own Queen "remained in the old Stock; but if ſhe "does not, the reſerved Queen may be put "to them, and they ſhould be immediately "reſtored to their former ſtand, and the "Bees or Swarm taken off, be carried to "half a mile, as before."

357. I have only made a few curſory remarks, by way of annotations, as the principle upon which the whole is founded, is repugnant to the experiments I have repeatedly made, on purpoſe to aſcertain its validity. Not that there can be any doubt, however, but that Mr. Wildman, among the multitude of hives he had turned up in his peregrinations, may have had an opportunity of ſwarming Bees in the manner deſcribed. But as I have often turned up hives, in order to ſeize the Queen, not only by myſelf but in preſence of gentlemen, ſufficiently converſant with Bee-Majeſty eaſily to diſtinguiſh her, without ever obtaining by this means the deſired proſpect,

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* So that this *following method* is a method to be taught us hereafter; and which we ſhall hereafter particularly remark upon.

pect. I cannot but conclude Mr. Wildman to be in an error. Beſides, it is generally known that, on a hive being tapped, or any diſturbance made, the Queen always retires for ſecurity to the inmoſt receſſes of the hive, leaving her numerous guard to defend the outworks.

358. Therefore to clear this point up, a public experiment is neceſſary. Let Mr. Thomas Wildman go in the proper ſeaſon into any judicious and practical Bee-Maſter's Apiary, and in his preſence, and that of ſeveral others, equally converſant with the ſubject, take a Stock of Bees up and make them ſwarm upon his plan. This would, if ſucceſsful, decide the point greatly to Mr. Wildman's honour.

359. I am particularly urgent upon this head, becauſe the method, if practicable, may be eaſily performed, and without giving much diſturbance to the Bees, and would therefore ſave a very tedious attendance in Swarming-time. Mr. Wildman alſo, in page 199, confidently repeats the ſame method of catching the Queen. Now if he can ſeize her majeſty ſo eaſily, why purſue that other more difficult method of *driving*, which he is known to practice to obtain her? But even this favourite operation cannot be performed without being well armed: for every Apiator knows, and muſt have experienced, often to his ſmart, that in turning up a hive, the Bees, filled with ire, and armed with poiſoned weapons, will attack him by hundreds, and make it very hot work, and

even dangerous to ſtand peeping after the Queen. Of this circumſtance Mr. Wildman ought ſurely to have apprized his pupils.

360. However from this firſt inſtance it appears, that Mr. Wildman has no ſecret power over the Bees, to cauſe them to come out of their hives at the word of command, as many people have erroneouſly imagined; for at page 198 he diſclaims all pretenſions to any ſuch power, and acknowledges the whole to be a manual operation, ſimply that of *driving* the Bees into an empty hive, and then catching the Queen.

361. But notwithſtanding this declaration, the *truth* obliges me to obſerve, that he has led the public into the above error, by expreſſly aſſerting in his hand-bill (which I have ſeen, and have by me) that "the fourth Swarm "he will *command out of the hive.*" As this is ſo repugnant to what he has given us in his book, the practitioners in the art will not be ſatisfied unleſs they have a direct proof in this inſtance, as in that before recited (358).

362 His method of driving is much the ſame as has been practiced for more than two centuries paſt. Butler deſcribes it, and before him Lawſon, Markham, and others, as well as a variety of authors ſince: therefore not to ſwell theſe pages unneceſſarily, I ſhall only give thoſe methods which I have found moſt convenient and eligible, and in ſuch a manner that all the operations ſhall follow each other in proper order, and without interruption;

tion; after which we ſhall take the liberty of making ſuch ſtrictures and obſervations as we judge and hope may be of general utility.

363. But by way of introduction to the reſt, we ſhall inſert Dr. Warder's * account of his captivating a Queen from a Swarm, as containing many intereſting and amuſing particulars.

364. He tells us, "That to ſatisfy his curioſity, he was reſolved to riſk the loſs of a Swarm; therefore about half an hour before ſun-riſe he took a Swarm of Bees that had been hived the morning before, to ſome diſtance from the ſtand, and ſtriking pretty ſtrongly the edge of the hive upon the ground, the Swarm fell out in a lump upon the graſs. As ſoon as they were a little quiet, he ſtirred among them with a little ſtick, to find the Queen; at length he diſcovered her, and quickly taking her, he cut off her wings to diſable her from flying, and put her into a little box with holes: the Bees left on the graſs were ſoon ſenſible of their loſs, ſpread themſelves every way in ſearch of their Queen, with a piteous and diſcontented note; in about an hour they roſe, and flew to the place where they had pitched the day before, and divided in little parties to look for her along the hedge: he then laid the box with the Queen in it near one of theſe little companies, and they immediately began to gather

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* The True Amazons, 1712.

gather from all parts, and encompaſs her all round with joyful ſounds, well known to thoſe who are uſed to Bees.

365. "The experiment was often repeated, placing the Queen ſometimes on one ſide, and ſometimes on the other; by which means he could march or counter-march them in any direction he choſe. It is very remarkable that though honey was offered the Queen while priſoner in the box, ſhe would taſte none while deprived of her family; nor did the Bees ſhew leſs affection for their Queen, they never would leave her, though kept five days and nights without food, at which period they all died martyrs to their loyalty; the Queen ſurviving them but a few hours."

To Unite *two or more* Swarms *or* Caſts.

366 AFTER having a ſmall Swarm or Caſt, in two or three days or a week you may have ſome others, all of which are to be hived ſeparately: about ten o'clock at night ſpread a cloth on the ground, near the firſt Caſt, and lay a hive floor on the cloth, with a ſtick acroſs, then take the hive which hath the ſecond Caſt, turn it up, ſprinkle ſome ſugar'd ale among the Bees, and then ſtrike the edge of the hive with ſome force on the ſtick, which will probably cauſe all the Bees fall out in a lump; but if not, repeat the ſtrokes until they do. The firſt Caſt muſt be immediately ſet over them, and in about an hour thoſe on the cloth will have crawled

up, and become one family. If any hang about the outſide of the hive, with a ſtick or feather ſtrike them off very gently upon the cloth, and when all are in, ſet the hive in its place: about five in the morning lift up the hive, floor and all, and withdraw the cloth, if there be any Bees on it, ſpread it over the hive, and the ſtragglers will ſoon enter therein: by crawling among each other all night, they become familiar and reconciled.

367. In the ſame manner a third or fourth may be added, until ſufficiently numerous to form a ſtrong Stock for the next year; but this muſt be done time enough for the Bees to lay up a ſufficient ſtore for the winter.

368. If this be done in the day-time, the Bees of both Caſts or Swarms will immediately proceed to fighting, or fly away; but being done in the night, it cauſes very little commotion, and very few Bees, ſometimes none, are ſlain, except indeed the invading Queen, who is generally diſpatched or expelled before morning; being often found on the ground, ſurrounded by two or three hundred of her faithful ſubjects, who will ſtarve themſelves rather than abandon their beloved Sovereign: a ſad and ſorrowful ſcene, to prevent which ſhe muſt be taken from them by a ſmall ſtick, and then her ſubject Bees being placed near the entrance of the hive, will preſently join the reſt.

369. In hives or boxes that have openings in the the tops, this operation may more

eaſily be executed, by raiſing the firſt Caſt and ſetting the ſecond or any other ſubſequent ones, under it, let it remain double until the next night, by which time they will be all in the upper hive, then lift it gentlty up, and take the under one away.

370. To prevent any affray, ſome have propoſed to take away the Queen of the Caſt when the Bees are knocked out, according to Dr. Warder's method, (364), and then to kill her. This, no doubt will certainly prevent ſlaughter; but it is very troubleſome, and takes up more time than country people can or will ſpare from their other occupations; therefore, as the damage ariſing from the preceeding mode is but trifling, it would ſeem preferable for common uſe; eſpecially if a little ſugared ale is ſprinkled over them, before they are incorporated. Caſts in the ſame manner may be returned to the mother Stock, to prevent their being too much impoveriſhed; which cauſes many to fail before the next ſeaſon. Theſe operations need no other defence than a pair of gloves.

371. Happy for Sovereigns of the human race, that the people are frequently ſacrificed for their good; and the prince but very ſeldom for the people's.

To

To DRIVE *or* SWARM BEES *Artificially, nearly upon Mr.* WILDMAN'S *Second Plan.**

372. When a Stock ſeems very full of Bees, and diſcovers the uſual ſymptoms of being ready to ſwarm; eſpecially if there appear many Drones, and theſe begin to lie out; it will be neceſſary to perform this operation: therefore about the middle of a calm and hot day (if ſuch offers), remove the Stock upon a cloth (laid ready upon the ground) and immediately taking it up by the four corners, carry it into ſome out-houſe, or the like, where but little light is admitted. Or it will be more eligible to have a ſtraw hive made on purpoſe in the form of a baſket, viz. narrower at bottom than at top; it ſhould be wide enough to admit any common ſtraw hive a little way within it, as far as three rounds of the ſtraw. Set this cloſe to the Stock, and inſtantly lift up the Stock and ſet it thereon; no Bee can then come out upon you; and when taken into the houſe, the whole may be turned upſide down, viz. the Stock at bottom, and the empty hive upon it; by theſe means the inconvenience of many Bees flying out upon you is prevented, which muſt always be the caſe when a cloth is uſed. But a far better method than either of theſe may be ſeen (382). But in either way the hives are to be ſupported by the

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* Management of Bees, page 193.

frame of a chair, a bucket, or any other convenient ſupport; and if a cloth is uſed, an empty hive ſhould then be ready, nimbly take the cloth off, and place the empty hive on; if it does not join cloſe, tie the cloth ſo faſt round as to prevent any Bees from eſcaping: with one hand ſupport the hives ſteady upon each other, while you keep ſtriking with the other hand about three parts round the full hive (for the part againſt which you ſtand muſt not be ſtruck) from top to bottom as nimbly as poſſible.

373. By this noiſe and diſturbance the Bees will be affrighted, and begin to aſcend into the upper hive, where there is more quiet. After beating a few minutes, put your ear from time to time to the top of the hive, and by the buz you will diſcover when any conſiderable number is aſcended up; until this happens continue the beating; ſometimes it will be half an hour, though generally only a quarter before this be accompliſhed. If the Queen ſhould happen to be ſoon diſguſted ſhe will quickly riſe, and the reſt will preſently follow with a great noiſe.

374. If notwithſtanding this, they do not riſe, take a ſmall ſtick in each hand, and beat round the hive ſmartly; the Bees by this time whether aſcended or not, will be ſufficiently tamed, ſo that you may raiſe the upper hive, reſting on its edge next you, a little towards the light. If they be moſtly got up, take the hive intirely off; but if not, hold it upon its edge between your ſide and left arm, and repeat the drumming againſt the part

where they have chiefly cluſtered (for the method muſt be varied according as you ſee the Bees affected) until you have got a ſufficiency to form a good Swarm: then ſet it down by you upon a cloth or floor, and return the Stock to its place again. If the Bees of both hives are preſently after quiet, and work kindly, it indicates that there is a Queen in each, and all will be well; at night the Swarm may be taken and ſet in the place deſigned for it, which ſhould be as far from the Stock as poſſible: but ſhould the Stock appear tumultuous and reſtleſs, it ſhews there is neither an old nor a young Queen. The Swarm muſt therefore be taken and ſet over, or by the ſide of it, the hive being raiſed by a ſtick, and the Bees, as well as the Queen, will return to the old hive again; otherwiſe your Stock will be intirely ruined.

375. If the Swarm has no Queen, it will ſoon quit the hive, and return home without further trouble. It will be proper to put an empty hive in the place of the Stock, to amuſe the returning Bees, during the operation.

376. Thus we have a *ſecond* method of forming a Swarm artificially, but without any regard to catching the Queen.

377. But by another proceſs (beſides the before-mentioned) Mr. Wildman gives us a ſlight notion of the matter under the article of joining a poor Stock with a rich, page 148. "For this purpoſe carry a poor and a rich "hive, into a room a little before night,

“ then *force* the Bees out of both hives in-
“ to two ſeparate hives,” as before directed,
(372) “ Shake upon a cloth, the Bees out of
“ a hive that contains the feweſt; ſearch
“ for the Queen,” (*how, in what manner?*)
“ and as ſoon as you have ſecured her, with
“ a ſufficient retinue, bring the other hive
“ which contains the greater number, and
“ place it on the cloth on which the other
“ Bees are, with a ſupport on one ſide, and
“ with a ſpoon ſhovel the Bees under it.
“ They will ſoon aſcend, and while under
“ this impreſſion of fear, will unite peace-
“ ably with the other Bees; whereas had they
“ been united to the Bees of the richer hive,
“ while in poſſeſſion of their caſtle, many
“ of the new comers muſt have paid with
“ their lives for their intruſion.”

378. By this means it is true we have all the Bees together; but he has forgot to inform us, what further is to be done with them.

However, we may gueſs at it from his further directions for uniting, page 223.
“ The beſt method of uniting Bees at this
“ ſeaſon (autumn) is to take the Bees out
“ of both hives, as already directed, then
“ to ſtrike the Bees of one of the hives
“ upon a cloth, take away their Queen, *and*
“ immediately place over them, the hive
“ in which the Bees taken out of the other
“ hive are. When united and quiet, *the*
“ *hive with honey,* in which they are to re-
“ main, *is put over them,* and they will ſoon
“ aſcend into it. This method requires too
much

much leiſure and patience to be generally followed.

My METHOD *is*:

379. Near the cloſe of the evening, when the Bees, wearied with the toilſome taſk of the day, are retired to their "golden "ſlumbers," I innocently invade their ſoft repoſe, by removing the weak hive into a proper place, with little light, and drive them (372) into an empty hive.

But here it muſt be obſerved, that the Bees will not be induced to quit the ſooner, by the loudneſs of the noiſe, ſo much as by the quickneſs of the ſtrokes, and the concuſſions of the hive; for which reaſon Bees quit a ſtraw ſooner than a box hive, wood ſuffering much leſs compreſſion than ſtraw. Now ſome Bees will always linger behind, however long you may drum (374); therefore, when the main body is out, thoſe that riſe upon the edges of the combs by beating, may be bruſhed or blown off by a bellows as they riſe; but if many ſtill remain, cut through the briar bindings, near the bottom, looſen the combs from the ſides, and alſo the ſpleets; you may then lift up the rounds of ſtraw, leaving the combs ſtanding, and blow the Bees out from between the combs with a pair of bellows: they will not reſent this ſo much, as being forced out by a bruſh or feather, nor will it injure them ſo much. In a box or hive of our conſtruction, the combs are to be ſeparated from the ſides,

which

which being lifted up, leave the combs ſtanding, as fixed to the bars.

380. As ſoon as it is fully evening, having all the Bees in an empty hive or box, which ſhould be of the ſame dimenſions as that of the rich Stock, (otherwiſe ſticks muſt be laid acroſs it and treated (372); turn the hive upſide down, ſprinkle the Bees with ſugar and ale, ſet them upon a ſtool cloſe to the floor of the rich Stock, which immediately lift off, and ſet upon the poor one; being thus doubled, place them where the rich Stock ſtood.

381. The ſprinkling renders the Bees not offenſive to the others, for by crawling among them it makes them ſmell all alike; and being done at night, they aſcend gradually, and as it were imperceptibly among the others. I have frequently done it without a ſingle Bee being ſlain. Let them ſtand thus four or five nights, having firſt ſtopped up the bottom door-way: after this time, you may at night take off the upper hive, and if all the Bees be out of the under one, or nearly ſo, take it away; ſhould a few remain, turn the hive on its ſide, with its open part to the door-way of the Stock, and they will have joined the reſt by morning; if not, ſtrike them out upon a board or cloth, and ſet them to the Stock, and they will then enter without difficulty: but if only a few of the Bees ſhould have quitted the under hive, double them again, and let them remain a week longer. This performance may be

done eaſily and ſafely with only a pair of gloves; though I generally do it without.

382. In order to unite the Bees of a common hive in Autumn with another Stock, by means of one of my conſtructed ſtraw hives, it will be neceſſary to meaſure the common hive bottom, to know whether it will ſtand within the compaſs of one of my wooden tops; if it will not, a wooden top ſimilar to mine, but wider, muſt be made on purpoſe. Near the cloſe of the evening take one of the wooden tops, with the ſliders therein, and place it upon ſome ſupport cloſe behind the Stock, which muſt immediately be lifted thereon, and the door-way ſtopped; then take it to an out-houſe darkened, and turn it upſide down upon a chair frame, tub, or the like; be careful in the turning to keep your left-hand ſteady upon the board, to prevent its ſlipping, and with your right-hand turn the hive. It will be proper for young beginners to tie the board down firſt. Be mindful alſo, that you turn the ſide in which the ſliders *enter*, upwards, as they may otherwiſe ſlip out, and permit the Bees to eſcape, and vent their fury on you. As ſoon as turned upſide down, ſet one of my ſtraw hives (with its top and ſtraw cover faſtened on) over it, then withdraw the ſliders, tie a cloth round the joining, and drive the Bees (372). This being done, ſet them upon a hive floor, and let them remain there until night, when being removed to the Stock you wiſh to join them with, thruſt the ſliders in at top, ſprinkle

them with ſugar'd ale, and ſtop the door-way; then take the ſtraw cover off, and immediately lifting the Stock up, put it over them, and either then, or the next night, ſet them thus *doubled* upon their proper ſtand. But a ſtill greater ſecurity will be to raiſe the Stock you would drive upon the wooden top, with its ſliders in, the night before the removal, at which time the door-way muſt be ſtopped, leaving only a ſmall chaſm for air; this prevents the poſſibility of a ſingle Bee's hurting the operator; ſo that a child, had it ſtrength ſufficient, might do it with eaſe. This mode I eſteem the moſt perfect of any, and capable of being brought into the moſt general uſe.

383. I now proceed to give a minute and *certain* method of finding and captivating the Queen; ſince, (as I have already obſerved) Mr. Wildman's firſt method has often failed us.

384. Having drove the Bees out of a Stock into an empty hive (372), let a clean and ſpacious board or table be in readineſs, as alſo a ſpoon and two or three pieces of ſtick, about half an inch thick. Set the empty hive on the table or board, with its edge reſting on theſe ſticks, and near the further end of the table; then inverting the hive that has the Bees in it, ſet it upon a ſtool cloſe to the table, and take up a ſpoonful of Bees at a time, firſt from the largeſt cluſter, and turn them leiſurely out upon the table, but ſo as not to hurt or cruſh them. They will preſently ſpread ſo that you may eaſily ſee if the Queen

be among them; be as quick with your eyes as poſſible, and if not in that ſpoonful, ſtrike the Bees under the empty hive; then proceed with another ſpoonful in the ſame manner, until you obſerve the Queen, whom you muſt immediately ſeize between your finger and thumb, and put into a ſmall box with holes in it, with ſome of the workers for company. But if after ſpooning all out, you ſhould have miſſed her, look upon the ground, as ſhe may have fallen down, and you may have trod on her. If ſhe be not found, you muſt repeat the operation, for among ſuch a multitude, it will be very eaſy to over-look her. If it is a Stock that has been drove to take away the young Princeſſes, in order to prevent ſwarming, according to Mr. Wildman, the whole of the Bees muſt nicely be examined, becauſe there may be three, four, or more Princeſſes; all of which are to be taken away. What Bees are ſcattered about may be taken up by the ſpoon, and returned to the reſt; or if the window be ſet open, they will fly to their uſual abode; or if an empty hive be ſet near them, and a room darkened, they will preſently aſſemble in the hive.

385. It ſhould always be carefully obſerved, that in turning up and holding a hive in order to drive the Bees the *edges* of the combs ſhould be next you, otherwiſe the flat ſides of the combs will be inclined to each other, and being very heavy the ſtrokes will looſen them, and they will fall againſt each other, and cruſh many of the Bees to death, perchance the Queen herſelf, and thus ruin the Stock.

386. It

386. It is very poſſible for a Stock to be taken up at the cirtical moment, when the Queen is gone out for air or recreation, therefore on driving no Queen will be found; but ſhe may return afterwards, or even before the operation of driving is finiſhed. This circumſtance ſometimes occaſions the experiment to prove fallacious.

387. A leſs tedious method of forcing a Swarm is, to ſet the Stock in its proper place after having drove a ſufficiency of Bees into a hive; and let theſe remain: if both are quiet and work, they have each a Queen; if not, beat the Swarm out by the ſide of the Stock, or ſet it upſide down with its edge even with the riſing board, and they will rejoin the Stock. Try again ſome days after.

388. But the following is a much readier and eaſier way, by means of hives or boxes conſtructed upon my plan. In the morning thruſt in the ſliders to the Stock you would Swarm, take off the cover, and ſet over it an empty hive, with its door-way ſtopped; withdraw the ſliders, and let them thus remain until about mid-day; then ſetting a ſtool, or the like, near the back of the Stock, lift it thereon, immediately ſtopping the door-way with a rag; carry it to ſome diſtance, and with two ſticks drum or beat againſt it, until by your ear you find there are a competent number in the upper hive, or if a box, you may ſee by the window. Again put the in ſliders, let them ſtand about half an hour, when, if both are quiet, the Stock ſhould be taken to its uſual place,

and the Swarm remain until night. But if you have not ſucceeded, put the Swarm over the Stock again, and try ſix or eight days after.

389. But if Bees muſt be *drove* to form an *artificial Swarm,* I ſhall prefer the Rev. Mr. Thorly's method, which he recommends for *uniting*; but which, with little variation, is much better adapted to our preſent purpoſe.

390. This is done by a narcotic fumigation, produced from the *fungus maximus,* or larger muſhroom, variouſly known by the name of burt, punkfiſt, frogcheeſe, puffballs, or mully-puffs. Theſe are of various ſizes, and ſome as large as a man's head: they are not fit for the purpoſe until ripe, at which time they turn brown, and are light; but if ſo ripe as to have the inſide turned to powder, they are uſeleſs.

391. They may be found about autumn, at the time that muſhrooms are; and generally on commons and dry grounds. They are to be dried gradually by the fire, or ſqueezed flat, and put into a paper bag, and then into a ſlow oven, after the bread is drawn, letting them continue all night. When they will eaſily catch and retain fire, they are fit for uſe.

392. With a pair of ſciſſars cut a piece of the punk, as large as a hen's egg (better at firſt to have too much than too little) and fix it to the end of a ſmall ſtick, ſlit for that purpoſe, and ſharpened at the other end, which is to be ſtuck into the inſide top of an inverted empty hive, ſo that the ſlit end of the ſtick may reach as high as the middle: the hive is then to be put into a pail or bucket near the Stock you want to ſwarm.

393. This done, ſet fire to the punk with a candle, and immediately place the Stock of Bees over it, tying a cloth (which you muſt have in readineſs) round the joinings, ſo that no ſmoke may come forth. In a few minutes time you may hear them drop like hail into the empty hive. When the major part are down, and you hear very few fall, beat the top of the hive gently with your hand, to get as many more out as you can; then looſing the cloth lift the hive on a table or broad board, and knocking the hive againſt it ſeveral times many more will tumble out, perhaps the Queen among them; as ſhe often falls one of the laſt. If ſhe be not there, ſearch for her among the main body in the other hive, putting them out upon the table; for the Bees will be quite ſenſeleſs, and you may handle them as you pleaſe.

They will continue ſo but a ſhort time, therefore, having taken all the Queens out, put as many Bees and a Queen as will be ſufficient to form a good Swarm into an empty hive, ſtop up the door-way, and place it as the greateſt diſtance; put the reſt and another Queen into the Stock, which ſet in its place again. The next morning unſtop the door of the Swarm, and deſtroy the ſuperfluous Queens; which will effectually prevent the Stock from caſting.

394. But as all theſe proceſſes of *forcing* a Swarm is like forcing a man and his family to quit both houſes and treaſure, which can ſcarcely ever be done without a great deal of trouble; permit me to accommodate matters,

ters, and propoſe a more gentle method of leading them imperceptibly to do what you would have them, without any violence. Not that it ſhall always be *more certain* than any of the foregoing, but as it can be performed with the greateſt facility, and is at the ſame time void of all danger or damage, both to the Operator and to the Bees, ſhould it not ſucceed, no harm is done, and but a trifle of time loſt.

395. To do this with common hives, have ready an empty one, and two pieces of wood, about two inches broad, and long enough to lay acroſs the hive that is to be moved; if one end of each of theſe pieces be cut circular, they will be better adapted to extend to the edge of the hive. Have alſo in readineſs a bucket, pail, or pan; or what is ſtill better, an old hive with the top cut off. On either of theſe place the Stock hive, that is full of Bees, and ready for ſwarming, upſide down; and immediately ſet the empty hive over them; then lift them thus doubled on the ſtand again. This muſt be done ſoon after dark, and with a pair of gloves on.

The next evening, the Bees being then quiet and reconciled, the joinings muſt be cloſed with tempered clay, or other plaiſtering, leaving only the uſual door-way, to which a reſting board muſt alſo be fixed.

396. This little diſturbance, if there be a perfect Swarm ready; that is, a competent number of Bees with a Queen and Drones; will cauſe them in a day or two either to riſe and ſwarm, or aſcend into the upper

hive, and there remain a ſeparate Swarm: both working cordially together and going in and out at the ſame door-way. Thus they are to remain until a little before the uſual time of taking honey.

397. They are then to be ſeparated at *night*, (605) carrying the upper hive to a ſtand at the greateſt diſtance. If the next day either of the Stocks ſeem tumultuous and diſcontented, that hive muſt be raiſed about half an inch: for being without a Queen, they will otherwiſe return to the other hive. Near the cloſe of the evening take it to ſome out-houſe, drum out the Bees that remain, and take the honey and wax for your pains. On the contrary, if when ſeparated the Bees of both hives are peaceable, and work as uſual, you may preſerve either the Swarm or Stock according as they are for goodneſs.

398. This buſineſs, however, may be conducted with ſtill more eaſe and certainty, by uſing hives or boxes of my conſtruction. Firſt, having thruſt in the ſliders over the Stock (in the day-time) take off the cover, then ſet on the empty hive, and withdraw the ſliders; let both door-ways be open. This ſhould be done as ſoon as the Stock becomes populous. When you find both hives are well filled (467, 586) in the middle of the day put in the ſliders; and if the Bees both above and below work as before, it is a ſign that there is a ſeparate Swarm in the upper hive, which at night ſhould be taken off, and placed as far from the Stock as it convenient-

ly can be; then faſten on the cover of the Stock, and withdraw the ſliders.

399. But ſhould either hive ſhew diſcontent, and there appear a great throng or croud about the door-way of the hive, it indicates that there is no Queen in the upper; and therefore the ſliders muſt be taken out, and the hives remain as they are, until more favourable ſymptoms appear, when the experiment may be again repeated. However, a careful eye muſt be kept over them, for after this alarm, though they may not chooſe to ſeparate and aſcend into the upper hive, yet they may all of a ſudden take it into their heads to ſwarm out, either on that day or the next.

400. As the whole of this operation is exceedingly eaſy and ſimple, a child may perform it; and ſhould it not happen to ſucceed, there is nothing to regret, nor any thing loſt.

401. Regard muſt be had to this circumſtance of a ſeparate Swarm, whenever you ſeparate double hives; for if the Bees, after ſome time ſpent in driving, do not ſeem at all inclined to relinquiſh their hive, it is moſt probable the top one is a ſeparate Swarm. Therefore, if ſuch a one is wanted to be kept, leave off driving, and ſet it in ſome diſtant place, and if that day or the next they work peaceably, and there be no extraordinary croud at the door-way of the old Stock, there is no doubt of its being a diſtinct Swarm.

402. It is a very eaſy matter to ſave the Bees of Stocks in common hives, without cruelly deſtroying them, and may be done

thus. Nearly at the cloſe of the evening take the Stock whoſe honey you want, drive the Bees out (372), ſprinkle them with ale and ſugar, and then ſet them under the Stock to which you would unite them. Let both hives thus remain until the cold weather ſets in; then early in the morning, or in the evening, lift the upper hive off, and ſet it upon a looſe floor, cloſe by; when if the greater part of the Bees have not quitted the under hive, turn it up on its ſide; with its open part as near the door-way of the Stock as poſſible, and the Bees will gradually quit their unſtored hive, and unite with the full one. However, let me here obſerve, that this buſineſs may be much more conveniently done, by means of my open top hives, into which the Bees may be drove, and the Stock ſet over them, with leſs trouble than by any other method whatever (382).

403. Having thus given a detail of the manual operations, it will now be requiſite to make ſuch obſervations, as may, perhaps, be of ſome ſervice in the *application.*

404. Driving of Bees is a very antient practice, but on accouut of its ſeldom ſucceeding has never come into general uſe. Butler obſerves that it was practiſed in Greece, Sicilly, Italy, &c. under three diſtinct conſiderations, viz. of exſection, or cutting off part of the combs, in Spring and Autumn, and of driving at Midſummer: all which he eſteems unprofitable or pernicious, at leaſt in our climate, whatever it might be in thoſe plentiful warmer countries. Nor from Butler's

time to this have we any better reaſons for approving of it, either for the purpoſes above-mentioned, or for that of Artificial Swarming.

405. We will firſt attend to what Mr. Wildman himſelf urges upon the ſubject. He acknowledges there is danger of killing the Queen in the operation; and conſequently (I will add) the loſs of the Stock. With reſpect to obtaining the Queen, he ſays, in page 198, "There is an art neceſſary to perform it, "namely, Practice, which I cannot convey "to them: nor can be ſpeedily attained; yet, "until this art be attained, *the deſtruction of* "*many hives of Bees muſt be the conſequence;* "*as every one will find on their firſt attempt to* "*perform it.*" To which let me add, *for ever after*. Nay, I will put it home to Mr. Wildman's own boſom, whether, notwithſtanding his frequent practice of *driving*, he himſelf does not often ruin a Stock of Bees by the operation? for the Queen is often loſt upon the ground, or cruſhed to death between the edges of the hive, or ſmothered with the running out of the honey. Many of the commoners are alſo killed or loſt, the combs are looſened, the eggs ſhaken out, and many of the embryos ſpoiled by the repeated concuſſions, and perhaps ſo chilled for want of their uſual warmth during the operation; that the whole or greateſt part prove abortive.

406. For by experiments made on my own Stocks, I am fully convinced, that however

ever well the proceſs may have been performed, Stocks ſeldom thrive after it. Whether this be owing to the cauſe juſt recited, or to the diſtreſs and terror the Bees ſuffer from the violence, cannot with certainty be determined; but ſo it is, the Bees never work kindly after it. Neither do I ſpeak this of my own Bees only, for the ſame ill ſucceſs attended all of this neighbourhood ſo treated, that have fallen under my notice; and this in ſo great a degree, that inſtead of benefiting the publick, it has more firmly riveted the people to their old burning cuſtom; ſo that they now abhor the very idea of further improvements.

407. But ſuppoſing the method had *ſo far* been eligible, there are ſtill greater objections againſt it, as being attended with a great deal of trouble and time; and when done, may probably prove to be labour loſt: for as there are no *certain* ſigns to indicate the preciſe time of a Stock's being ready to ſwarm, the operation may conſequently be attempted before there are Drones or Queens ready; in which caſe it muſt be repeated, perhaps ſeveral times: a ſport I believe few country-people will be brought to delight in, unleſs the Bees, like flys, had no ſtings, and there was nothing to fear, nor more to do, than to turn up the hive, and ſeize the Queen, as Mr. Wildman directs, at page 199.

408. We may further object, that although the operatton ſhould prove ſucceſsful, and a complete Swarm be obtained thereby; yet the *chief* benefit for which the practice is

deſigned (viz. to ſave the trouble of watching the riſing of the Swarms) is not anſwered; becauſe the births of the Princeſſes are very uncertain both with reſpect to time and numbers. Although you take out all the royal brood cells which you perceive at the time of driving, yet there may be ſome you can neither ſee nor come at, or others may be built afterwards. Swarms may therefore afterwards riſe with ſome of the Princeſſes, without being perceived (as no watch will be kept) and may not only be loſt, but what is ſtill worſe, the Stock will thereby be ſo impoveriſhed, as moſt probably to periſh before the next year's honey-gathering.

409. From the whole I think we may ſafely infer, that it will be much better to lull them aſleep by a doſe of Thorley's ſoporiferous fume (389), from which no damage can ariſe either to the Queen or the other Bees; tho' how far the brood may be injured I cannot ſay. This operation will not take more time than the other, and a ſmall quantity of fume does the buſineſs. I have tried the fume ariſing from many ſorts of gum reſin, and other drugs, none of which would either kill or ſtupify the Bees, except the fume of ſulphur.

This however is certain and total deſtruction if there is ſufficient of it to pervade the whole hive for a few minutes; but in a leſs quantity, many of the Bees will recover when expoſed to the air again, while others perhaps may eſcape being affected at all, and be able as ſoon as the hive is lifted up, to revenge the death of their friends. Gunpowder in half an ounce made damp, and managed as directed for waſps (671), will have the ſame effect on Bees: but the combs and Bees are greatly diſcoloured thereby; therefore of the two a ſulphur rag is preferable.

410. But to return and make ſhort of the matter, I can ſee no good reaſon for forcing of Swarms at all: let me aſk what are the advantages? If to keep the Bees conſtantly and wholly at work, this may be done by doubling, that is, adding an empty hive to them as ſoon as they have occaſion (480, 484). If to ſave the expence and trouble of watching them in ſwarming-time be the object? this I acknowledge would be of ſome advantage, could the operation be eaſily done, and terminated ſucceſsfully; but this we have ſhewn is not the caſe. The expence of hiring a child to watch cannot exceed ten ſhillings in any year, in moſt perhaps not half; what perſon who has a dozen or more hives would grudge ſo trifling a ſum? and where there are fewer Stocks, and out of the view of the family, can it be prudent to riſk the deſtruction of ſome of theſe few Stocks by the operation, for the ſake of ſo ſmall a ſaving, when the preſervation of a ſingle Swarm will amply repay it?

411. Beſides, in a large Apiary, it will be a very arduous taſk to drive a great many Stocks; and ſome of them moſt likely two or three times over. To this may be added, "the very great riſque of deſtroying the

" Queen, which is of the utmoſt importance, " for the leaſt injury done to her brings im" mediate deſtruction to the hive." * How can it be thought that country people can ſpare thoſe hours of attention; can ſupport that anxiety and care; and acquire that dexterity, to be gained only by a courſe of many years experience;‡ which are Mr. Wildman's inſtruments of witchcraft in theſe operations; unleſs, like him, they had nothing elſe to do?

412. We have eſtimated the expence of watching at ten ſhillings, but ought we not to balance againſt this the labour and trouble of driving in the Artificial way? I believe no one would do that buſineſs under ſixpence a time, and eſtimating this only once to a Stock, will take off one half; but as it may be required to be repeated two or three times, it may ariſe to as much, if not more, than watching; not to mention that after all this expence there is a great chance of loſing after-ſwarms: for, relying upon what has been done, no attention will be given to prevent it. The moſt plauſible argument in favour of this practice is, that it is neceſſary when Stocks will not ſwarm in due time; but what then? If they be doubled, no harm can poſſibly ariſe; they certainly beſt know their own condition, and there may be many impediments to ſwarming beyond the reach of our inſpection. What good will coercion do?

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* *T. Wildman on the Management of Bees*, 199.

‡ *Ibid.* 201.

do? Had we not better *lead* them gently, according to their own propenſities, than to riſk their ruin and our own reverſionary profit, by irritating them by our violence? Inlarge but their habitations, and ſo far from being indolent, they will labour with the moſt anxious and unremitting aſſiduity to repleniſh their hives, as far as nature's bounty can ſupply, and make you a preſent profit of a hive or two of virgin honey; and the next year a large and early Swarm: thus amply recompencing your forbearance and care.

413. After all, both from Mr. Wildman's own acknowledgment, as well as from what we have related of the matter, it appears that the danger and difficulty, muſt render the practice wholly unfit to be generally followed; and though it is now ten years ſince it has been introduced, but a very few perſons have adopted it, and ſeveral of theſe have relinquiſhed it from its unſucceſsfulneſs.

414. Now although we hold driving to be very pernicious to *Stocks* when done for the purpoſe of *ſwarming* them; yet we do not mean that it is ſo when performed for the ſake of uniting (366) or of ſeparating hives, which will be treated of hereafter (607); provided that Stock *only* which is to be taken be drove; for *any Stock that is deſigned to ſtand*, ſhould by no means be meddled with, except to raiſe or to double it; and the leſs diſturbance the Bees have the better.

415. However, if any one ſhould chooſe to ſwarm the Bees by force, let him always

carefully obſerve that it muſt never be attempted until they give very ſtrong ſigns of being ready for the ſeparation. A calm ſtill day muſt alſo be choſen; for turbulent weather diſcommodes them in their work, and makes them angry and revengeful. The middle of the day, when they are moſtly abroad, is likewiſe to be preferred. For if ſwarmed, when the greater part are at home, there will be a large Swarm it is true; but the Stock will thereby be too much reduced; and the brood ſuffering for want of its uſual warmth and attendance, will alſo fail, ſo that before the next ſummer, the Stock itſelf will periſh, or be too poor to do any eſſential ſervice.

416. Before any perſon attempts to perform this operation, he ought to be well acquainted with the appearance of a Queen Bee. If he has not this piece of knowledge he muſt acquire it, either by ſearching for one among ſuch of his neighbours Bees as have been ſuffocated, or by applying to ſome experienced perſon to ſhew him one. For unleſs the Apiator can diſtinguiſh her at the firſt glance, it is a hundred to one but ſhe eludes the ſearch, when he attempts the performance; and which happens ſometimes to the moſt experienced, even at a time, when there are two or three Queens in the Stock. Therefore when the Queen is not found, the Bees muſt be all ſpooned (376) over again. And if ſhe be not then found, the old Queen has ſecreted herſelf

among the combs, and will not quit her poſt, however long you may drum. (379).

417. Or perhaps, at the critical moment that a Stock is taken, the Queen may be gone out to recreate and air herſelf, and conſequently you muſt miſs her in the hive.

418. That ſhe does ſo, I once, and only once, had ocular demonſtration. One of my Stocks, at the latter end of the ſummer, had ſuch a prodigious number of Drones, that they conſumed, almoſt all the honey, as faſt as the labourers procured it. This I thought ſhameful, and therefore, was determined to kill great part of theſe luxurious cormorants, as faſt as they appeared at the the door-way. At this time, there was a large number of workers at the door, drumming with their wings, and uttering joyful ſounds. Unluckily attempting with my finger to cruſh a returning Drone, as I thought, though it proved to be the Queen I hurt her, though not mortally, ere I perceived my miſtake. She ſtaggered, and was unable to walk. The concourſe of Bees that were at the door ſaw her diſtreſs, and were in the utmoſt conſternation; they licked her with their tongues, and uſed all the little endearments they could to reſtore her. This continued ſome minutes. But being ſtill diſabled, a number of Bees got under her, and carried her upon their backs into the hive.

420. I was not without my fears for the event, as ſuppoſing ſhe would die with the injury: However, the next day, the Bees

worked with the ſame alacrity as uſual; conſequently the Queen recovered.

421. From this inſtance I conjecture, that the Queen often makes an excurſion in fine weather, accompanied with a great retinue. At this time alſo numbers croud the door, drumming with their wings, and the whole hive ſeems full of joy. I had obſerved this circumſtance many times before; but never ſuſpected the reaſon of it until then; and no doubt others have obſerved the ſame. My own avocations are too numerous to ſpare the neceſſary time for ſuch minute and cloſe inveſtigations as to aſcertain whether it be upon the above account or not, that the Bees appear in that unuſual manner. Perhaps ſome ingenious Bee virtuoſo, who is bleſt with ſufficient leiſure to make the neceſſary obſervations, will be able to clear up this point.

422. But to return to our ſubject. When a ſufficiency of Bees to form a Swarm are driven out of a Stock, obſerve whether there be any royal cells ſealed up; if there are, ſet the Stock in its place again, tho' there ſhould be on Queen; for as there ſoon will be one, the Bees in that expectation will go on with their works. And the Swarm may be ſet in ſome other place; without the trouble of turning them out, to ſearch for a Queen: unleſs you want a ſpare Queen for any particular purpoſe, either of uſe or curioſity.

423. But if it appears that there is no royal brood, ſet the Stock in its place, and minutely

examine all the drove Bees, and take out all the Queens. If only two are found, put one to the old Stock, and the other to the Swarm, ſhould there be more than two, ſelect the two largeſt; the others may be reſerved, with a few Drones, in a little box with holes, laying a little honey on the top for their ſubſiſtence; or if they be put in a glaſs veſſel, and watched, you may perhaps be entertained with the conſummation of the royal nuptial. A moſt ſurprizingly rare ſight! We cannot, however, diſmiſs this ſubject without ſhewing how to fix a Swarm to any place you wiſh.

424. Let it be remarked, and it is very wonderful, that ſuch wild, ferocious, and revengeful inſects as Bees, ſhall by a few minutes confinement, and ſmartly beating upon their hive, be diveſted of all their courage and ferocity; and become ſo tame, as to ſuffer themſelves to be taken up in the hand, without diſcovering the leaſt reſentment, unleſs you hurt them. For when they have been taken off the ſtand, carried to ſome diſtance, confined by means of a cloth or another hive placed over them, and the hive has been briſkly drummed upon for a ſhort ſpace, their panic and terror is ſo great, that you may do as you pleaſe with them. In conſequence of which, the Queen is then to be ſearched for, and when found, is to be put into a little box which you ſhould have ready for that purpoſe. Then take her into a cloſe room, cut off one of her wings, which will

prevent her eſcaping, tie the fore part of her body round with a ſilk thread, ſo as not to injure her; or rather put her into a very ſmall bag of crape, catgut, or other like open materials; pin it to your hat, cap, or any thing elſe you would chooſe, and lay it down cloſe to the Swarm. The Bees will ſoon gather round her, and remain there until they die, if you do not remove them.

425. Thus ſeveral Swarms, driven out of as many diſtinct Stocks, and confined with their reſpective Queens, may be fixed upon different parts; as one upon the head, one upon the ſhoulders, and another upon the chin; by tying a ſmall bandage with the Queen faſtened to it, to each particular part. Or, by the ſame device may be fixed to a pole, and carried where-ever you pleaſe. By a ſtrong ſhake of the head, they may immediately be diſlodged therefrom if the Queen has been placed there without confinement, having only a wing clipped. Or they may be taken off with a ſpoon. If a Queen be taken away and concealed from a Swarm, near a window that is open, the Bees will preſently fly into the air; but by placing the Queen again in their view they will preſently return. This will appear to have been done by a word of command, to perſons unacquainted with the ſecret.

426. But theſe are merely tricks, that tend more to deſtroy, than improve Bees; and is beſides ſo very diſtreſsful a ſcene, that no true lover of theſe very uſeful inſects can

practice it without regret, and therefore I ſhall inlarge no further upon it.

427. Though I have ſaid Bees by driving are made very tractable, yet, let me apprize you, that however nimbly the introductory part, viz. that of taking the hive off the ſtand, and ſetting it on another, or on a cloth, may be done, ſome Bees will inevitable eſcape, and be apt to ſting you. Therefore a young beginner ſhould always put on a ſafe-guard, eſpecially if he has not been familiar with the Bees before. I generally do it with only a pair of thick leather gloves on.

428. Before I cloſe this chapter, I cannot refrain from addreſſing myſelf to thoſe who will not be perſuaded to their own good, but will obſtinately purſue the old deſtructive method of ſuffocating their Bees; imagining that "by deſtroying them they may have "the greater increaſe," a notion as void of ſenſe, as it is of truth, unleſs we could verify Virgil's mode of raiſing Bees from a dead carcaſe. We ſhould think it the higheſt abſurdity and cruelty in a king to ſay, in order to multiply my people, I will find means every year, to have many thouſands of them cut off.

Let my intreaties prevail on ſuch to practice the method I have propoſed (395, 402). It is not more expenſive, and requires but little trouble; who that has a ſpark of common ſenſe, or common humanity would grudge that, for the preſervation of ſo many thouſands of uſeful and induſtrious inſects? Was the *Supreme Being*, to treat us as the country people treat their Bees, how wretched would be the ſtate of human nature!

429. Dames and good women, I conjure you by all that is good and praiſe-worthy, not to deſtroy your Bees, leſt you yourſelves ſuffer in ſome future ſituations. After having read this book, you cannot plead ignorance, but muſt for ever remain inexcuſable.

CHAPTER XIII.

Particular Inſtructions how to manage Glaſſes of various Figures, and in different Arrangements, as well for Entertainment as Emolument.

430. THE inimitable works of theſe wonderful inſects have in all ages engaged the attention, not only of the naturaliſt and philoſopher, but alſo of every perſon endowed with the leaſt ſpark of genius, or ſpirit of enquiry. To gratify ſo laudable a curioſity, we will now proceed to exhibit to the inquiſitive, the ſeveral methods of obtaining a more perfect inſpection of their extraordinary works and œconomy.

431. But let it be premiſed, that the uſe of glaſſes, is not wholly reſtricted to *amuſement*; they are of real uſe, by enabling

us to take honey from the Bees, when in its greateſt perfection. The faſhion and arrangement of glaſſes for the above purpoſes depends, indeed, more upon fancy, than any preciſe rules. We ſhall, however, deſcribe ſuch as we think the moſt eligible.

432. That kind of glaſs globe, which is made uſe of for ſtreet lamps, will do as well as any, and is eaſily procurable; the open part, we ſhall call the bottom. It ſhould hold about a peck; for, if bigger, it cannot in many ſituations be filled in time. A ſtick of a proper length, muſt be placed upright in the middle of the globe, with holes near the upper part, to receive two other ſmall croſs ſticks, to keep it ſteady; that the Bees may the better fix their combs therein. In ſome places, globes may be had with a hole at the top, on purpoſe to receive the ſtick, which is to be faſtened over the top by a ſmall peg. If the inſide of the globe be previouſly rubbed with wax, ſo as to roughen it, the Bees will be greatly aſſiſted in crawling up.

433. The floor on which it is to ſtand, muſt have a bevil or ſlant cut out, three inches wide, and deſcending from the middle to the edge, which muſt be left very thin; by this means, when the globe is ſet on, there will be a free paſſage for the Bees, at this part under the edge of the glaſs; directly under which, the deepening ſhould not be above three-eighths of an inch.

434. The firſt large Swarm that riſes, is to beput into this globe inſtead of a hive. There ſhould be Bees enough nearly to fill it; but if not, add a Caſt (366) to them afterwards. For if your ſituation ſhould not be a very plentiful one, or the ſummer ſhould prove unfavourable, a ſmall quantity of Bees will not be able to fill the globe, and a box beſide, which they ſhould do; for they cannot be kept in the glaſs, through the winter, without periſhing. The globe is then to be ſet in a Bee-houſe, and a cloth or ſome other convenient covering muſt be placed over the glaſs, to keep the light from the Bees; for otherwiſe, *that*, and the novelty of their habitation, will be ſo diſguſtful to them, that they will be apt to quit it.

A piece of empty honey-comb, (if virgin the better) placed previouſly in the glaſs, (493) will the ſooner reconcile them to it; and if in two or three days afterwards, they have begun to work; there will be no danger of their deſerting it.

435. When they have nearly filled the globe, or ſeem to want more room, raiſe the glaſs upon another hive or box (480). In about four or five weeks after, if the ſeaſon has been favourable, the brood will be all in the under hive or box; and the globe, filled with honey and wax, may be taken off for the owner's profit.

436. But after the firſt week of July, whether they have filled the globe or not, they muſt be raiſed on a box, that they may begin

to work therein for their winter ſtore. About a month after, take the globe off at night, and the next morning turn it up, and tap the ſides with your fingers, until the Bees have quitted, and left it to your diſpoſal. If they do not readily come out by tapping, blow now and then among them with a bellows, which will haſten their exit.

437. Another method is, by ſetting a globe *over* a ſtrong Stock, as ſoon as honey gathering commences (480, 484). But as the bottom of the globe being circular, will not extend over the openings of the box or hive; therefore, before you ſet it on, place in the ſliders, then ſetting the globe on, lay pieces of tea cheſt lead (that from the bohea cheſts, as being thickeſt, will be beſt) tin, tile, or clay over the openings, which may extend beyond the circle of the bottom of the globe, at the ſame time raiſing the edge of the globe in front near half an inch by two pieces of ſtick, at three inches diſtance from each other, for a door-way for the Bees; the reſt of the raiſed part, ſtop with clay, or cow dung. Then withdrawing the ſliders, the Bees will aſcend, but the ſooner if a piece or two of a comb be previouſly fixed in it (434). The door-way of the Stock muſt alſo be ſtopped, in order to compel them to paſs out only from the middle. The bottom door way muſt however be opened three or four days after they have begun to work in the globe, and then the middle, or globe door-way muſt be ſtopped up, that the Queen

may be prevented from depoſiting any of her eggs in that. By this means, the globe will be filled with *intire* virgin honey and wax, and ſhould be taken off as ſoon as it is ſo (480).

438. But the moſt minute, as well as the moſt comprehenſive view of the Bees and their operations, is to be obtained by cauſing a Swarm to work in ſeveral diſtinct glaſſes without any hive at all. For this purpoſe, procure ſeven three-pint glaſs veſſels of any form you pleaſe. Glaſſes, however, in the form of a flower beaker, (fig. 13.) without top or bottom, and not above eight inches high, will not only make the beſt appearance, but will likewiſe ſupport ſuch pieces of empty combs, as are to be placed in the upper part, to a great nicety, without any other contrivance than circular pieces of plain glaſs cut out ſo as to cover the tops; or, if another range of glaſſes are deſired to be ſet over theſe; pieces of rattan or mahogany wood may be ſubſtituted, either with circular holes, or ſlits, as moſt agreeable. (The beaker form I would recommend as the moſt eligible for all glaſſes that are to be ſet over Bee-hives, or boxes, to thoſe perſons who purchaſe Bee glaſſes on purpoſe).

439. A board or frame muſt then be prepared of the proper dimenſions for theſe glaſſes to ſtand on, with their mouths, or open ends downward. The circles made by the glaſſes being marked, four or five circular holes, each about three quarters of an inch diame-

ter, or ſlits half an inch wide, are to be made within each circle, over which the glaſſes are to ſtand. This board or frame muſt be raiſed an inch, by nailing a broad hoop round it; or if ſquare, by nailing on fillets of wood, obſerving to cut out a proper paſſage for the Bees in the front fillet. The whole apparatus ſhould alſo have a bottom, or floor to ſtand on.

440. A portion of fine virgin comb muſt be placed in each glaſs, ſo as to extend from one ſide to the other. Small ſlips of combs on each ſide of the other, will preſerve it from falling when the Bees firſt aſcend, and when the work is compleated, appear the handſomer.

441. The apparatus being thus in readineſs, and every glaſs ſet in its place, let the firſt large early Swarm you have, be hived as uſual; but if not a large one, add a Caſt afterwards (366). As ſoon as the Swarm is hived, take them to ſome out-houſe, catch the Queen (384), cut off one of her wings, (as otherwiſe ſhe will not ſtay) and put her into one of the glaſſes, (turned with its mouth upwards); and with a ſpoon, as ſoon as poſſible, put in as many Bees to her as you conveniently can, and then turn it down upon its place over the board. The reſt of the Swarm is by ſpoonfuls at a time to be forced under the board; which, if raiſed a little, will admit them the more eaſily, and they will ſoon aſcend into the glaſſes. At night, ſet the glaſſes down cloſe to the floor

again, and put the whole into the Bee-houſe; or if deſigned to ſtand in a room in the dwelling-houſe, the direction of (135) is to be obſerved.

442. When the glaſſes appear nearly full, or the Bees ſeem to want room, they are to be raiſed on a box hive. But, as the dimenſions of the frame, on which the glaſſes ſtand, may be too large for the top of the box, to obviate this difficulty, four pieces of wood muſt be nailed, or dove-tailed together, ſo as to leave an opening of the ſame diameter as the top of the box. But the pieces muſt be ſufficiently broad to reſt upon, and likewiſe extend beyond the edges of the box, far enough for the frame to ſtand upon. Lay this ſquare on the box, and in the evening, lift up the frame and glaſſes, from the floor, and ſet them upon the ſquare, that has been previouſly laid over the box.

443. If the frame will not readily part from the floor, by reaſon of combs fixed thereto, they muſt be previouſly looſened, by a long and very thin knife; or a ſheet of tin thruſt under it. The next morning, the paſſage or door-way of the frame muſt be ſtopped, to oblige the Bees to paſs only through that of the box.

444. As faſt as the brood are hatched, and the vacant cells filled with honey, the glaſſes are to be ſucceſſively taken off, by ſliding a piece of tin under each; then nimbly taking the glaſs to ſome diſtance, turn it up, and tap about the ſides with your fingers,

gers, and in a little time the Bees will quit it, without offering you any injury.

445. But ſhould they not be filled in time (615, &c.) they muſt nevertheleſs be taken off, one or two in a day, that the Bees may be compelled to begin their works in the box. If any of the glaſſes ſhould have a conſiderable brood in them, cut out as much of the combs as have honey in them as you can, and fix thoſe parts that have brood in them into the glaſſes again, until they are hatched. Or the whole may be kept to work without a box until honey-gathering be over. In this caſe, as faſt as any glaſſes appear full of honey, and without brood, they ſhould be taken off, and empty ones put in their place; but as ſoon as honey fails, *every* glaſs that is full, and without brood, muſt be taken away at night, and the others are to be ſet over another Stock.

446. When all the glaſſes are off, put in the ſliders of the box, and draw it a little away from the front, raiſing the frame about half an inch; at night you may ſafely take it off; perhaps there may be many Bees in it, and it may alſo be full of combs; ſet it upon its edge by the ſide of the box, and by morning the Bees will have left it; if not, drive them out. Let it be obſerved, however, that little pieces of tin, tea-cheſt lead, tile, or wood ſhould be ready, to cover the holes with when the glaſſes are taken off.

447. By this proceſs the Bees being compelled to work in *ſeven* diviſions, thereby afford the moſt conſpicuous *view* of all ther

operations, and in a far ſuperior degree than when in larger bodies; for then being very much crowded by numbers, and incloſed by combs, little ſatisfaction can be obtained, and the inquiſitive mind muſt be greatly diſappointed. Not that this contrivance, or indeed any other of boxes with ſliding frames, drawers, or ſurrounded with glaſs windows can poſſibly give a view of the *Queen* as often as the owner pleaſes, or as Mr. Wildman ſeems to promiſe; for if there be but a *ſingle comb* in a diviſion, the Queen will *not be ſeen* but when ſhe depoſits an egg; at all other times ſhe is ſurrounded and veiled from our ſight by her numerous retinue.

448. Upon the above plan, a pyramid of glaſſes may be ſo arranged as to form a beautiful encampment of theſe wonderful inſect warriors. Boards muſt likewiſe be provided, of ſuitable dimenſions, to lay between each range of glaſſes, and correſponding holes made in them; that the Bees may paſs freely through, from the lower to the upper.

449. Another way is to have a glaſs circle or hoop, without either top or bottom; over this a board perforated with proper holes is to be placed, on which another glaſs of leſs dimenſions may be put, and ſtill ſmaller glaſſes round that: indeed there are many other contrivances of this kind, that an ingenious fancy may deviſe, and to which we can fix no limits: the whole, as may be ſuppoſed, from the expence attending them, are deſigned

only as elegant exhibitions for perſons of fortune.

450. However, it muſt be remarked, that the number of the Bees is to be in proportion to the number and bulk of the glaſſes, and alſo to the height of the aſcent; for glaſſes more than one ſtory high two good Swarms will be required, making together about half a buſhel. Nor muſt the exceſſive labour it will coſt theſe induſtrious inſects in theſe ſlippery tenements be forgotten; and therefore to ſhorten their taſk, no glaſſes ſhould be above ſeven or eight inches high; otherwiſe, multitudes will die of the toil, nor will the Stock be worth any thing the next year.

451. With reſpect to taking off the glaſſes; this is to be performed in the ſame manner as the preceding. The whole ſhould be taken off the firſt week in July, and drove together in an empty box, when the Bees having time enough before them, will be enabled to fill it. Or if left until autumn, the Queen muſt be taken from them; and if very numerous, the Bees muſt be divided, and united to other Stocks.

452. We now deſcend to deſcribe a more humble, though much more uſeful plan, viz. that of ſetting only one range of glaſſes upon a box or hive; by which we may be enabled to draw the honey from the Bees at the critical time, when the moſt aromatic flowers, that yield the fineſt honey, are in perfection.

453. There are glaſſes to be had in London, blown purpoſely of ſeveral ſizes;

theſe are globular in the upper part, but contract towards the bottom. This figure I ſuppoſe is adapted to ſecure the combs from falling out, and at the ſame time to form a more pleaſing ſpectacle. As to the firſt intention, it is perfectly needleſs in ſuch ſmall veſſels, as the Bees will fix their combs ſo as to require no ſuch ſupport; while the globular contracted form of the glaſs gives the combs an inconvenient ſhape, and renders them incapable of being taken out, without being previouſly cut. Common tumblers are preferable to theſe, but the beaker form (fig. 13) as before obſerved, is by far the moſt convenient.

454. Nor ought any of theſe to be leſs than half a pint, for I have often obſerved, that in ſmaller veſſels the Bees waſte a great deal of time and labour, by not having ſufficient room to work in, crouding too much upon each other, ſo that many, when they are got therein, are obliged to return back again with their loads.

455. Before the glaſſes are ſet on a box hive, or the cover taken off, the ſliders muſt be put in. Then having in readineſs pieces of tea-cheſt lead, adapted to cover any openings that might appear, ſet on the glaſſes, and having covered all the crevices with the lead, keep it tight by ſmall ſtones or pieces of lead thereon; but where lead cannot be eaſily come at (though every conſiderable tea-dealer can furniſh it) pieces of tin will do. All being now ſecured, ſo that no Bee can get out at the top, withdraw the ſliders, and cover the glaſſes with a cloth or the like. But where glaſſes

are

are ſet on a ſtraw hive, and not in a houſe, the circular part of another ſtraw hive, without a top, is to be placed as a circle round the glaſſes, and a pan to cover the whole; both of which may be lifted up at pleaſure, and the glaſſes viewed with as much eaſe and ſafety (ſtanding at the back of the hive) as with boxes in a houſe. It is beſt to ſet the glaſſes on near the cloſe of the evening.

460. Each of the glaſſes muſt have a piece of empty comb, placed acroſs the top; without this inticement it will be a long while before the Bees will aſcend to work in them, and oftentimes not at all; but with this, they will begin the very day. Every year, portions of fine comb ſhould be reſerved for this purpoſe, carefully wrapped up in paper, and placed where they may be kept dry, and no moth get at them.

461. As ſoon as the glaſſes are filled with combs, and theſe with honey, (which you may know by the cells being nearly all ſealed or covered over with wax) they are to be taken off, and empty ones placed in their ſtead. The nice point now conſiſts in determining the quantity that can ſafely be taken away; for otherwiſe you may take ſo much and ſo long, as to leave the Bees no time to ſtore their hive ſufficiently to ſupport them through the dreary ſeaſon of winter. Regard here is to be had to the ſtrength of your Stock and the goodneſs of the ſeaſon. In ſituations where Stocks uſually afford a hive of honey (beſide their own) about that quantity may be

drawn from them. Where profit only is intended, confection glaſſes of two quarts each will be beſt: a ſingle glaſs may be ſet on firſt; if they ſeem eager in filling it, it indicates plenty of paſturage, and you may then venture to ſet on more. Alſo, when there are honey dews, they ſhould be fully ſupplied with glaſſes. When they ſeem too much crowded in the bottom hive, it ſhews they have not room enough in the top, and more or larger veſſels muſt be furniſhed them, elſe they will either lie out or ſwarm. About the middle of July the honey in general begins to fail, therefore the glaſſes muſt be all taken off; likewiſe whenever the Bees ſlacken their work in them, the ſame method muſt be purſued; for if kept on longer, *they will begin to* feed on the honey that is in the glaſſes. When combs that have honey in them, are put into glaſſes the Bees will eagerly aſcend, and carry away all the honey, and then under a fooliſh miſtake begin to work, and refill the cells again.

462. Obſerve alſo, that no glaſſes are to be ſet on a Stock that is intended to ſwarm; nor over any that you purpoſe to take; as it will prevent the Bees from filling an under hive.

463. Some ſeaſons are ſo unfavourable for honey, that no Stocks will bear drawing, without being too much impoveriſhed thereby; beſides which, attention muſt be paid to ſuch Stocks as being much more numerous in Bees than others, will fill ſeveral glaſſes, while others ſhall not be able to fill one. No

diſcriminating rules can be given for every caſe, ſomething muſt be left to diſcretion, and to obſervation formed upon practice. Bees will much readier fill glaſſes ſet over them, than by the ſide or collateral.

464. Inſtead of glaſſes, either where theſe are not to be had, or where curioſity is not the motive, old cracked mugs or pans may be ſubſtituted, and will ſufficiently anſwer the purpoſe.

465. By this method we acquire more perfectly, with more eaſe, and without running any riſque, all the advantages intended by the frequent ſhifting of hives, ſo much extolled by ſome authors; and this moreover without giving any diſturbance, or doing any injury to the Bees. At the ſame time you are enabled to indulge in the pleaſing contemplations, and to examine at leiſure with what aſſiduity and ſagacity theſe our diminitive ſervants effect works of ſo much wiſdom and utility.

CHAPTER XIV.

The METHOD *and* TIME *of* RAISING *or* DOUBLING HIVES *and* STOCKS.

466. IT has already been obſerved (282) that Stocks ſhould be double hived when they begin to lie out. We now add,

that they are likewiſe to be ſo when you wiſh any particular Stock not to ſwarm; as alſo, when they ſhew ſigns of being too much crouded, and want an enlargement of their habitation. Laſtly, Stocks that have not ſwarmed by a certain time, muſt be ſupplied with an additional hive.

467. By the term *Raiſing* Stocks, is generally meant the operation of ſettng an empty hive under a full one, or upon lifts or ekeings. While by that of *Doubling*, we mean the adding an empty hive to a full one, by placing it under, or at its ſide.

468. Before we proceed further, it will be highly proper to be able to judge of the fullneſs of a hive, in order to its being doubled, eſpecially of ſuch as are without windows. This may be tolerably well aſcertained, by attentively obſerving in the day-time the croud going in and out of the hive. If the croud be conſtantly greater than formerly, the number of the Bees has moſt aſſuredly been conſiderably increaſed. Some ſhare, however, of experience is here abſolutely neceſſary, as that alone can enable us to determine with the requiſite preciſion: therefore, as another, and indeed by no means an inconſiderable help, ſtrike the ſides of the hive with your fiſt in the evening; and if it be full of Bees you will hear a great buz all through the hive; but if partially filled, the buz will ſeem to come moſtly from the middle. The hive alſo, if full of combs and honey, will feel

tight and ſolid to the ſtroke; whereas if there be only a few combs, it will ſeem hollow, both in ſound, and to the touch.

469. When numbers of Bees are obſerved to play idly about the entrance of the hive, while others keep drumming with their wings; and if at the ſame time the hive feels heavy; it is a certain ſign that the Bees want more room, either for themſelves or their honey; and the Stock muſt therefore be immediately doubled. For it is likely they cannot ſwarm, either for want of a Princeſs or of Drones, and therefore being inactive at a time when there is moſt honey to be got, the moſt precious part of the ſeaſon will be loſt, in waiting longer for their ſwarming. Nay, if the ſituation and ſeaſon be very good, a Swarm may ſtill riſe notwithſtanding the doubling.

470. No Stock ſhould be raiſed*, until repleniſhed with Bees; which in ſome years is not until the latter end of June or middle of July; and ſhould they then continue ſcanty and feel light, ſuch muſt *not* be doubled at all, unleſs you firſt add a Swarm or Caſt to ſtrengthen them.

The greater the number of Bees in the ſpring, and the heavier the hives, from the number of combs, the ſooner the Stocks will want doubling. This may be done in ſuch caſe in May, or if the ſpring be very early in April.

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* *We ſhall uſe the terms* Doubling *or* Raiſing *as ſynonimous, when applicable to the collateral or ſtory method.*

471. Such Swarms of the preceding year as are populous and weighty, will be the fitteſt to ſet glaſſes or ſmall veſſels on inſtead of doubling; for theſe will be good Stocks for the next year.

472. It has employed much time and ingenious contrivance to prevent the Queen's breeding in the old hive or box, after a freſh empty one has been added to it. But in ſome ſeaſons ſhe *will* do this whatever methods may be taken, either in the collateral method, or that of raiſing. This I have ſeveral years experienced; but eſpecially in the year 1779, I obſerved that of old Stocks which had been raiſed three ſtories, and all of which were well filled, the *two* uppermoſt hives had broods in them when taken even in the autumn.

473. From hence I infer, that next to glaſſes or ſmall veſſels, the ſureſt way of obtaining the greateſt number of *intire virgin hives,* will be to place empty hives *over half* of thoſe Stocks which were laſt year's Swarms, and are now in proper condition, while the other half may be *raiſed,* or ſtand to ſwarm. By this management theſe Stocks will work themſelves down into the *under hives,* and thus form freſh Stocks for next year, and are then to have empty hives placed *over* them in their turn; while the others are at the ſame time to be raiſed, as being then of two years ſtanding. Thus they are to be changed alternately, year after year, furniſhing a large quantity of fine honey and wax, and at the

at the ſame time alſo preventing any of your hives ſtanding more than two years; longer than which no Stocks ſhould be ſuffered at any rate to continue in one hive; for after that period the combs become black and filthy; many of the cells choaked up with old and uſeleſs farina; and the whole hive peſtered with moths and other inſects, often to the intire deſtruction of the Stock. To prevent miſtakes, the ſtands ſhould be all numbered, and a regiſter kept of the age of each Stock.

474. Never let any of the Stocks want room, for that will teach the Bees to be idle. They ſometimes require enlargement very ſuddenly; for by a large delivery of young in the ſpace of a few hours, the hive will become too much crowded; which will probably occaſion a ſudden and unexpected Swarm to riſe.

475. The Stocks of the laſt ſeaſon that appear ſtrong, and which you intend to *raiſe*, may remain *ſingle* until the Swarm be out; for if raiſed before, it may prevent ſwarming, or elſe retard it until too late. But ſhould any of the Bees lie out more than three or four days (281), rouze them from their beginning inactivity by raiſing them.

476. But if you have Stocks enough already, and therefore do not want Swarms, ſet an empty hive under them as ſoon as ever they either ſeem crowded, work briſkly, or the weather be enticing.

477. The ſame thing muſt alſo be done to all Stocks that are two years old and upwards; for they will by theſe means be frequently prevented from ſwarming; and conſequently there will be the greater chance of their quitting their old tenement and filling the new under one in time.

478. The raiſing of Bees has been directed by Mr. Wildman, and other writers, to be done in the day-time: this I have found a very troubleſome and diſagreeable taſk, and not to be executed without receiving ſome ſtings, unleſs properly covered. Boxes with ſliders that ſtand in houſes, are however to be excepted, becauſe the Bees do not ſee the aggreſſor before the operation is over.

479. But to do it with ſtraw hives without giving offence to the Bees, and with the greateſt eaſe to the operator, the evening, when it is but juſt light enough to ſee how to place your inſtruments, is a much properer time; or a clear ſtar or moon-light night will be ſtill better. It may be done however late at night by the light of a candle and lantern, brought no nearer than is abſolutely neceſſary, which is better than in the cloſe of the evening; for the later this buſineſs is executed, the more quiet and ſleepy are the Bees, and, before they are much alarmed, the operation will be over.

480. The method of doing it is this; ſet cloſe to the Stock a ſtool, chair-frame, or the like, ſo that it may ſtand firm; have ready an empty

hive with its cover off, and alſo a hive floor. Lift up the Stock, floor and all, very gently, put it upon the ſtool, and place the empty hive and floor upon the ſtand; the Stock muſt then be lifted up from its floor, and ſet over the empty hive. The floor with the looſe Bees on it, muſt be placed and ſupported, ſo that the edge may touch the door-way of the Stock, or at leaſt the edge of its floor. Many Bees will oftentimes be left on it; but they will join their companions before morning. However, if there be any danger of rain, they muſt be ſecured therefrom by a proper covering. A pair of gloves is all the defence neceſſary for this operation.

481. Where hives have not a *moveable floor*, this operation will be more troubleſome to perform, and ſome of the Bees will be killed, by ſetting the empty hive over the looſe ones that remain on the ſtand after the Stock is lifted off, and ſet upon the ſtool. When the empty hive is in its place, the Stock is then again to be lifted up, and put upon it. Thus for want of the advantage of a moveable floor, the Stock undergoes a double removal and diſturbance.

482. Early in the morning, examine if you have ſet the hives right; the upper door way upon a line with the bottom one. If there be any openings, ſlip pieces of tin or tea-cheſt lead over them, and plaiſter them and the joinings with clay, or any other proper ſubſtance.

483. But obſerve this *general rule*, do no more at the time of any operation than is abſolutely neceſſary. It is always beſt if the Bees inſult you, to go from them for a little while, and then return and do a little more. By this gentle mode of proceeding, you will accompliſh it with eaſe and ſafety, and without any breach of friendſhip.

484. When an empty hive is to be ſet *over* a Stock, you have only to ſhove in the ſliders of the latter, take off the cover, then ſet the empty hive over, and withdraw the ſliders. This may be done with very little riſk in the day time; but at night there is no hazard of receiving even a ſingle ſting.

485. As the variation in joining collateral boxes, conſiſts only in introducing the ſliders into the ſides inſtead of the tops, there needs no farther explanation. Whenever a hive or box be ſet *under* another, keep both door-ways open for ſome days: this eaſes the Bees of the unneceſſary labour of climbing up the empty hive with their burdens, perhaps for weeks, before the upper one is ſo full as to induce them to work in the under. But ſhould they not in two or three days work out at both door-ways, ſhut the upper one, by which means, they will become acquainted with the bottom entrance. In a few days after, open the upper one, and they will continue to paſs out of both; and if they are then nearly in want of room, or if there be plenty of honey to gather, it will compel them to work in the under hive;

and they will do this the ſooner, in proportion to the eaſe with which they can either aſcend or deſcend. And not only much time and fatigue will be ſaved by this management, but the hives will be alſo much ſooner filled. A conſideration which ought to be of great weight with the owner. Nor is this all: for by adding a hive early, with the middle door-way *open*, the Bees are in no wiſe hindered, and whenever ſo diſpoſed, will deſcend without any care or attendance of the Apiator.

486. Here it may be proper to obſerve, that if a good Stock or Swarm be purchaſed about ſwarming-time, it ſhould be ſet on an empty box or hive, ready placed with its door-way ſhut, until the Bees be well acquainted with their new ſituation.

487. In collateral boxes, both door-ways may be left open when firſt doubled; which ſhould be early. The Queen, having then room enough in one box, will not be tempted to move into the other, until more combs are wanted, for her continually increaſing family. Therefore, about the middle of the honey harveſt, or the firſt week in July; due regard, however, being had to the nature of the ſeaſon; ſtop up the door-way of that box, which is intended to be taken for the honey. The Queen will ceaſe, in general, to depoſit her eggs therein, and the Bees will have ſufficient time to fill the brood-cells with honey, as faſt as they become empty.

488. The ingenious Madam Vicat, a Swiſs lady, who has favoured the world with ſome ſenſible remarks; and alſo an experienced writer, under the ſignature of a *Lover of Bees,** which may be found in the appendix to Mr. Wildman's treatiſe; have from their experiments concluded, that Bees will not aſcend to work in an *upper hive*, unleſs late in the ſeaſon, and when they have neither ſwarmed, nor have any hopes of a Princeſs. Want of room will then oblige them to aſcend, but if a Princeſs be bred, they will rather ſwarm than do it.

489. Theſe obſervations are in general true; and while the Bees are confined to the paſſage of the bottom hive *only*, and with ſo few, and ſuch limited openings, as they ſeem to have been in the experiments made by connoiſſeurs, the ſame reſult will almoſt always be obſerved. But with more inlarged, and better diſpoſed communications, and with a *proper management of the door-ways*, in the manner above deſcribed, the Bees will act differently, induced by the great facility with which they can accompliſh their deſigns.

490. Glaſs, in particular, is very diſagreeable to Bees, and ſo unlike any habitations they are uſed to, that nothing but neceſſity,

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* *Whoſe method of ſetting one box* before another; *had been tried before Worlidge's time, and was found unſucceſsful.*

or the ſtrong temptation of a comb, previouſly placed in it, will intice them to build therein.

491. Neither muſt it be concluded, becauſe ſome Stocks cannot by any management whatever be induced to work in an upper hive, that therefore it is from averſion. For they may have a ſufficiency of room already. To which may be alſo added, that ſome years, and ſome ſituations, may be ſo bad, as not to yield a ſupply ſufficient to fill two boxes: or the Bees may not be ſufficiently numerous to perform ſo much work. Under ſuch circumſtances as theſe, it will be in vain to expect the Bees to work, either in an under or upper box: and therefore the failure cannot with any propriety or ſhadow of reaſoning, be attributed to the ſcheme or mode of management; unleſs you can ſuppoſe the author pretends to inſtruct you how to command the ſeaſons alſo!

492. The better to elucidate this point, permit me to recite an experiment, which I have frequently repeated. This conſiſted in placing an empty box hive over one with a Stock in it, after previouſly fixing in ſome pieces combs, filled with honey, by way of decoy: The Bees always aſcended immediately, and with the greateſt avidity eat up or carried away all the honey, under a ſuppoſition, that it was placed there for that very purpoſe, or might be ſoon taken away again. But finding afterwards, that the combs remained, they began to refill the cells; and gradually

added others until they had filled the box. While in other boxes without decoys, they have only raiſed ſome combs, upwards between the bars, without conſtructing any at the top, or filling the box.

493. Some years ago I had a *ſmall* box; the top of which had the uſual number of holes. In May the Bees ſeeming to want room, another box was ſet over it, and the lower door-ways ſtopped. The Bees on this entered in at the upper paſſage, and went through the holes into the under box without diſcovering the leaſt inclination to work in the upper one, although at the ſame time there was ſuch plenty of honey paſture as occaſioned them to caſt out a great number of their brood to make room for their honey. Provoked at this, I took the empty box off, (a perilous taſk with ſuch boxes) and inverting the full one, ſet the empty one over it, bottom to bottom, without any bars between. This at once hit their fancy; they preſently not only extended their combs upwards, but alſo began combs at the top of the upper box, working them downwards, ſo that the upper and under combs met, though not in right lines; the whole forming a curious and groteſque appearance. Nor have I ever ſince found that by ſetting boxes over others that had holes in them, after the common manner, or communicated with each other by partial openings only, the Bees could be induced to work in the additional box.

494. But where bars have been uſed, if the ſeaſon has been good, they have ſeldom diſappointed me. It may be proper here to relate a remarkable inſtance of two Swarms, each of which when hived, being too numerous for one of my ſtraw hives, many of the Bees were forced to lie out. Empty hives were then ſet over each of the Swarms; and during the ſummer they half filled theſe with the pureſt honey and wax.

495. Theſe examples prove inconteſtibly the propriety and advantages of bars, over any other conſtructions; the reaſon ſeems to be this, the openings between the bars coincide ſo well with thoſe between the combs, that the Bees meeting with no obſtacle to their aſcent, are deceived into a notion that the two boxes are but one; and therefore carry on their works without heſitation. Happy for us, if many of the falſe notions among men proved as beneficial.

496. Bees that are kept in common ſtraw hives, are often obliged to be idle for want of room, greatly to the owner's diſadvantage. To remedy this, ſuch Stocks as are weighty and ſeem full of Bees, and that have not ſwarmed by the middle of July, or by the time the black-berries begin to blow (for ſeaſons and ſituations muſt be allowed for) eſpecially if the weather has been fine; ſuch Stocks I ſay ſhould be turned upſide down, and empty hives placed over them (493). The Bees being in this unnatural poſition, will more readily go into the empty hive, than if they had

been ſet over it in the common way. This will generally be the caſe; but it muſt be allowed that ſometimes neither one way nor the other will ſucceed. Therefore after they have been doubled a few days, it will be proper to try how matters ſtand, by ſtriking the upper hive with your fiſt in the evening, when the Bees are all at home. If a large quantity of them have fixed themſelves in it, you will hear a conſiderable buz; but if this be not the caſe, fix in another empty hive a comb with honey in it; and at night take the other empty hive off, and place this in its ſtead: inticed by the honey-comb, they will ſoon aſcend and begin to work.

497. Another way is to turn an empty hive upſide down, and near the bottom cut an opening ſufficient to form a proper door-way, to which fix an alighting-board; lay the uſual bars acroſs the top, and at night ſet the full hive over it; and either then, or early the next morning, block up the other door-ways, and plaſter the joining all round, ſo that no Bee can come out, but at the new bottom entrance. This will anſwer better, as being more agreeable to their uſual ſtile of building; but after they have ſtood thus a few days, in order to ſhorten the toil of the Bees crawling up the empty hive, open a middle door-way; and if they then work at both paſſages, it is a ſure indication that they have begun to make combs in the under hive. By this management they are continually kept employed to their maſter's advantage; and

not

not only ſo, but when the hives come to b ſeparated, the bottom one may probably contain a Swarm, and be reſerved as a Stock for next year (398).

498. Who that poſſeſſes but a ſmall portion of humanity, and has the example of theſe induſtrious creatures continually before his eyes, will not pluck from his boſom the hand of ſlothfulneſs, and perform this kind office, as well to encreaſe his own ſtore, as at the ſame time to ſave the innocent and deſerving inſects from the murdering match!

499. A leſs advantageous method is purſued by ſome country-people; theſe uſe what they call an *ekeing* or *liſt*; conſiſting of three or four rounds of another hive, the edges of which are made even, and ſewed down with packthread. The full hive is raiſed on theſe, to give them more room. This practice is attended with many inconveniences, and often proves inſufficient for the intended purpoſe; and therefore it is beſt to raiſe them at once, as before directed (480), eſpecially as it may be equally, if not more eaſily performed. When it is obſerved that the Bees in the ſpring ſeaſon do not carry in farina, it is to be apprehended that the Queen is dead. If ſo, as ſoon as their honey is conſumed, and often before if honey paſture be commenced, they will relinquiſh their own hive, taking with them what honey may be left, and unite with ſome of the other Stocks, occaſioning thereby an

unuſual cronding at the door-way of ſuch Stock, as though invaded by robbing Bees; or as if they were going to ſwarm. When ſuch circumſtances appear, the *Queenleſs* Stock ſhould at night be ſet over ſome other (480, 484).

500. To thoſe who have glaſs windows in their hives or boxes, it may be of ſome uſe to know, that when Bees begin to work in a hive, they conſtruct the rudiments of ſeveral combs at once: and to accompliſh this with the greateſt eaſe and expedition, a part of the Bees are formed into as many diſtinct ranges, hanging down from the top like ſo many chains, by which thoſe that are to faſhion the combs, aſcend and deſcend. If the number of Bees be very great, they hang cloſe and thick, like ſo many curtains; but if not many in number, few only can be ſpared for this purpoſe; therefore they then form chains of ſingle Bees, linked to each other by the claws, the bottom Bee keeping the whole link ſteady by clinging faſt to the floor; but this being a hard taſk, it holds it but a few minutes, and then it gives place to another. In the evening they draw up to the top in a cloſe cluſter, to take their neceſſary repoſe.

501. When therefore a Swarm has been hived, or a Stock doubled, and the Bees hang down as above deſcribed, it is a ſure ſign that they have begun to form ſome combs therein; or if it be a doubled Stock that has not ſwarmed, there is no danger that it will, if honey-paſture be plentiful, until the additional hive

be nearly filled. In ſtraw hives that have no windows, by gently lifting them up behind, a peep may be had without danger.

502. There have been inſtances of ſuch very hot ſummers as to melt the honey, and ſoften the combs ſo much as to ruin the Stocks. The ſummer of 1779, had in ſome places this effect: in ſuch caſes ſhelter the hives as much as poſſible, by mats, bags, long ſtraw, or branches of trees, and alſo raiſe the hives half an inch or more, to admit the air. In bee houſes ſet all the doors open, and frequently water the ground about the hives.

503. In all extenſive Apiaries, it will be uſeful to keep two or three Stocks in boxes, as ſerving for indexes or ſtandards, indicating the ſtate or ſucceſs of all the other Stocks. The windows affording aproper and ſufficient inſpection for acquiring ſuch information.

CHAPTER XV.

Of the PASTURAGE *or* FLOWERS *proper for* BEES; *with a Catalogue of them, and Obſervations thereon; alſo, of the proper Number of* STOCKS *requiſite for different Situations.*

504. HOwever ſkilfully Bees may be managed, the profits ariſing therefrom muſt in a great meaſure depend upon the

goodneſs of the ſituation for paſturage; or in other words, upon the quantity of ſuch flowers as will yield the greateſt plenty of fine honey, and of farina for the ſuſtenance of the brood.

505. Bees under very indifferent management, where a profuſion of food can be ſpeedily acquired, will ſucceed *better* than others under the moſt *ſkillful,* can poſſibly do, where bee-flowers are ſoon exhauſted, or are inconſiderable in quantity, or at too great a diſtance.

506. On the other hand, in a bad ſituation, and with bad management, they will produce but a trifling advantage; and ſhould a few untoward ſeaſons ſucceed each other, they will be reduced to nothing. To theſe united cauſes is owing that ſcantineſs of Bees obſervable almoſt in every county of this kingdom, ſome particular heaths and commons excepted. For as theſe are generally ſkirted by woods, and as woods, heaths, and commons hardly ever ſuffer from the ravages of the unſparing ſcythe, the Bee-flowers are left untouched. Particularly favourable are ſuch commons as are thickly covered with mole-hills, on which the wild thyme ſpreads its aromatic ſweets; but pleaſing to the Bees alone; to ſheep and other cattle unſavory, and by them unheeded.

507. Where heath or broom abound the collections of honey are very large; theſe plants continuing very long and late in bloom,

often to November; but though the *quantity* of honey be very conſiderable, yet its *quality* is very ordinary; perhaps there is none worſe, except that acquired from buckwheat, which alſo furniſhes a profuſion.

508, Honey collected from gardens, is in England generally ſuperior to any other; as theſe afford more aromatic and ſweeter flowers than either fields or woods; but then the quantity is very ſmall compared to the other.

509. It is an error, however, to ſuppoſe that the Bees gather from all ſweet flowers, indiſcriminately: ſo far from it, they are very nice in their choice, and entirely reject thoſe we moſt eſteem. The choiceſt productions of the flower gardens, as roſes, pinks, hyacinths, auriculas, ſweet-williams, ſtocks, honey-ſuckles, jeſſamines, and many others of gorgeous and varied hues, as well as highly fragrant odours, are all as uſeleſs pageants to our Bees, unworthy their leaſt regard: while flowers of little or no apparent beauty, and ſo minute as to appear to us ſcarce worthy of notice, furniſh to them the choiceſt ſtores, and the richeſt repaſts.

510. But where a choice is denied them, like the poor among mankind, they are compelled to feed on coarſer diet: nay, inſtances are upon record of their collecting from noxious plants, highly prejudicial to health. The large wild Bees indeed collect from all ſorts of flowers; but their honey is deſpicable.

511. The following catalogue of flowers, contains thoſe *only* that I have obſerved the Bees to viſit with any conſiderable attention. They are arranged according to the ſucceſſion of blowing, except that ſeveral blow at the ſame time, and many of them vary according to the time of ſowing or planting.

512. Winter Aconite, Lauruſtinus, Snow Drops*, Hazel, Crocuſes*, Sallows, Oziers, Primroſes, Violets, Standard Almonds, ſingle Wall-Flowers*, Apricots, Peaches; Nectarines, Plumbs, Cherries, Pears, Turneps*, all the claſs of Braſica or Cabbages, Coleworts, * &c. Gooſeberries, Dwarf Almonds, Roſemary,** Apples, Strawberries, Tulips, May or White Thorn, Heath,* Goſs, or Furze, Star of Bethlehem, Borage**, Raſberries*, Laburnum, Columbine, Barberries, Beans*, Syringoes, Sweet Briar, Muſtard, Tares*, Clover, Spiked Star of Bethlehem, Cucumbers, Greek Valerian, Bladder Sena, French Willows*, Thyme**, White Poppies, Mignonette**, Blackberries, LimeTree, Hyſop*, Garden Fennel*, Naſturtium, Ladies Fingers*, Cats Tails, Sainfoin, Buckwheat*, Maples, Alders, Sweet Scabius, Sunflowers, Spaniſh Broom, Starwort, Michaelmas Daiſies, Winter Savory, Paſſion Flower, Jacob's Beard, and the larger Ivy.

513. Thoſe articles marked with a * are ſuch as produce the greateſt quantity of honey or farina; and thoſe with ** ſuch as afford honey of the higheſt perfection.

514. If this laſt was depoſited by the Bees in cells by itſelf, it would be in the higheſt requeſt and of great value; but as honey from inferior flowers is collected at the ſame time, both ſorts are mingled together, and form an aggregate in quality, proportionate to that diverſity: therefore, glaſſes ſet over boxes or hives, at the critical time, that is, when the choiceſt flowers bloom, ſeem the moſt eligible method of collecting the moſt of it as perfect as it can be obtained.

515. Of the flowers here enumerated ſome furniſh farina, and others honey; and ſome both. Farina is gathered very *early* in the ſpring, as ſoon as the Bees begin to breed, and is continued to be collected until autumn; whereas in general the honey-harveſt does not begin until late in the ſpring, and is over early in the autumn or before.

516. Farina is that ſimple duſt or flour found on the ſtamina of flowers, and varies in colour according to the bloom from which it is collected; but in general it is yellow. This the Bees bruſh off, and form into little balls, and fix into little cavities of their legs, and carry into their hives, to feed the brood with, while in the maggot ſtate. This is commonly thought to be wax, but it is not ſo; nor has it any of the properties of wax; neither can it by any art that we are acquainted with be converted into a waxy ſubſtance. After many repeated boilings it will not aſſimilate either with the wax or the

water. Beſides, was it wax a Swarm would collect moſt of it when they were firſt put into a hive; the reverſe of which is evident, for then they are ſeen to carry hardly any; whereas in the ſpring, when a Stock can want no wax, they are ſeen to carry in the largeſt quantity of farina.

517. The country-people have given it the appellation of *Bee-bread*; they might rather call it brood-bread; for there is no proof from any of the obſervations that have been made reſpecting this ſubſtance, that the Bees feed upon it themſelves. It is moſt probable that the Bees ſwallow this ſubſtance, and concoct it in their own ſtomachs in ſome degree, and then feed the Bee-maggots therewith. Its proper name is *farina*; and to prevent injurious miſconceptions of it in practice, we ſhall conſtantly call it by that name.

518. The winter aconite is the firſt bloſſom that furniſhes this farina; the ſnow-drop and crocus follow: after theſe the ſallows, eſpecially the white ſallow, which will be cloathed with bloſſoms ſo replete with this yellow duſt, that the Bees will cluſter ſo thick upon them, as might induce one to think a Swarm was going to ſettle there. Many of theſe near an Apiary, muſt be greatly ſerviceable, as will alſo plenty of crocuſſes and ſnow-drops; as alſo *ſingle* wall-flowers.

The whole claſs of cabbages, ſavoys, broccoli, &c. if let run to ſeed, or to ſprouts, will afford very ſeaſonable ſupply, when the bloom of other plants becomes ſcarce. Turneps,

neps are uſeful. Almonds afford a moderate quantity of farina; gooſeberries yield more, and raſberries exceed both.

519. The fruit trees afford honey of a good quality, ſo do beans, but not in great quantity: vetches or tares, and buckwheat yield it in great plenty; ſo does clover, but the white forms the beſt honey. Heath and broom furniſh very large quantities, when hardly any other flowers are left. Spaniſh broom is much extolled by Bradley; but if the Bees can find honey in other flowers, this will be wholly neglected. Roſemary blows early and holds long, and is perhaps the firſt aromatic plant that ſupplies the Bees with honey, and that of a fine quality.

520. But the two moſt favourite Bee-plants for honey are lemon-thyme, and borage. Lemon-thyme continues to bloom a conſiderable while, and furniſhes a moſt delicious honey, for colour and fluidity like mountain-wine. Large quantities of it may be planted for edgings, as well in the kitchen garden and pleaſure ground, as in the flower diviſion. It takes up but little room, if properly trimmed once a year.

521. This elegant plant forms a pleaſing ever-green edging all the year; but when in bloom the ſlight purple hue of its flower, contraſted with its green and yellowiſh foliage, attracts the eye, while the organ of ſmell is regaled, and the ſenſes enlivened by its aromatic odours. At the ſame time the jocund Bees humming their joyful ſongs, rove from

flower to flower through every walk, and excite the moſt pleaſing ſenſation in a mind bleſſed with ſympathetic ſenſibility.

522. But of all plants *Borage* ſeems moſt devoted to the ſervice of the Bees, both on account of its *long* continuance in bloom, and the excellent quality of its honey. It well deſerves the ſignificant epithet of *Bee-Flower*.

523. It may be managed ſo as to flower from early ſpring to November, if no froſt of conſequence ſhould intervene. It affords plenty of ſeeds, and if theſe be ſown at different periods in any ſoil, the plants may be raiſed ſo as to be in ſucceſſive bloom as long as the weather will permit the Bees to collect their honey. From this plant they will gather at all times, even when the atmoſphere is ſo wet or cold as to deprive all other flowers of their honeyed ſweets. But theſe plants ſhould be confined to a particular ſpot; for ſhedding their ſeed very faſt, when once in the ground it will be difficult to exterminate them. Thoſe ſown by hand, or ſelf-ſown, when come up muſt be thinned by an hoe in the ſame manner as turneps, to make them blow the the ſtronger.

524. Mignonette is another Bee-flower, but as I was not acquainted with it, as ſuch, until this year, I cannot determine as to the quality of its honey: the Bees ſeem as fond of it as of borage, and will gather from it as long. It may alſo be continued in bloom until the latter end of November, by ſowing it at

different times; therefore, if the compaſs of ground allotted for the Bee ſtands be ſown with this or borage, and proper path-ways made, it would be of ſingular benefit to the Bees, and afford no ſmall pleaſure to the ſpectator; eſpecially if an edging of lemon-thyme be added, and the extreme circumference planted with roſemary.

525. I have been lately informed of a flower which grows on the borders of Hertfordſhire and Cambridgeſhire, about Barkway and Royſton, and is there called *Cats-tails.* It is found once in three years, according to the labouring-people, from whom I have received this intelligence, in very great plenty, and furniſhes a prodigious quantity of honey, tho' a very troubleſome weed to the farmer. This plant, however, is not confined to thoſe parts, for I have ſince heard of it in the fields about this part of the country, though too late for me to profit by the information. The beſt deſcription I can procure of it at preſent is, that from the root many round ſtalks ariſe, which aſcend higher than the corn: theſe ſtalks are rough, hairy, and in a ſmall degree prickly, and beſet with browniſh ſpots from top to bottom. The leaves are narrow like wall-flowers, and are placed ſingle one above another at ſmall diſtances on each ſide of the ſtalks, and are of a pale green. The ſtalks are furniſhed with branches all the way up, which are about two inches in length, and cloſely ſet with flower-buds; theſe decreaſing gradually towards the end reſemble a cat's

tail. The flower-buds, at their firſt appearance, are of a purpliſh colour, but afterwards, when expanded, of a pale purple or blue; and are nearly funnel-ſhaped, with a purple thrum. It blows in June, and, I ſuppoſe, is annual. From its producing ſo large a quantity of flowers in ſucceſſion, it would ſeem to be a valuable plant for the Bees.

526. Perhaps, there may be a variety of green-houſe plants very acceptable to Bees; but as theſe are confined to gentlemens ſeats, we paſs them over as not being of general uſe.

527. There are ſeveral flowers mentioned by ſome authors, which are omitted in my catalogue; becauſe I could not perceive the domeſtic Bees take any notice of them; notwithſtanding ſome of them derive their appellations from the Bees, as mellilot, apium, honey-wort, meliſſa or baulm, &c.

528. Lavender and baulm, though apparently excellent Bee-flowers, were to my ſurpriſe generally neglected, or viſited but very ſparingly by the Bees.

529. The autumnal ſtar-wort, or Michaelmas daiſy, are ſerviceable Bee-flowers. That ſpecies, however, ſtiled by Millar* the Italian blue, and which he tells us is the Amellus of

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* *Gardener's Folio Dictionary, Ciſtus.*

Virgil, does not ſeem to anſwer to Virgil's deſcription:

"The flower itſelf is glorious to behold,
"And ſhines on altars like refulgent gold."
DRYDEN's VIRGIL.

An honour much too glorious for ſo mean a flower.

The root boiled in generous wine is what Virgil preſcribes to reſtore ſick Bees. I believe it has no ſuch virtue; but as the falernian wine elevated Virgil to ſing immortal ſongs, it may probably have a cordial effect on the Bees. Good Engliſh ale, a liquor Virgil never taſted, will however prove more ſalutary.

It is very likely that a difference of climates, as well as of ſeaſons, may occaſion a very conſiderable difference in the nature and diſpoſition of flowers for yielding honey.

For it may be remarked, that though in ſome years the Bees will collect from ſweetbriars, May, or white thorn, Greek valerian, honeſty, or lunaria, and ſome others; yet in other ſeaſons they will not be ſeen to touch them. This may ariſe from the peculiarity of the weather, as to heat or cold, moiſt or dry, at the blooming-time of the above flowers. In a very wet or very dry ſeaſon, flowers yield no honey. If the former happens while the beſt flowers are blowing, the Bees muſt collect from very inferior ones, as their choice is then limitted. They will be nearly in the ſame dilemma when there is a long ſucceſſion of very hot weather: for though the honey collected at the firſt opening of the bloſſoms is excellent, yet the heat cauſes theſe to dry and fall off ſo ſoon that the quantity is very ſmall.

530. Inſtances are very common of leſs honey being collected (in ſome ſituations) than was ſufficient to ſupport any Stock through the winter: much leſs to afford any ſurplus to the owner (571).

531. The ciſtus labdanum hath its leaves covered with a clammy kind of gum, from whence I was induced to hope it might furniſh the Bees with *Wax*; but they never applied to it for that purpoſe; the flowers indeed they ſometimes gathered from, though but ſeldom. Nor could I ever obſerve them to collect any thing from laurels, pines, or firs; though ſome writers have aſſerted that they collect their wax from thoſe trees.

532. The great Boerhaave mentions their gathering wax from the roſemary leaves. I have many of theſe plants about my Apiary, and have frequently and attentively obſerved them, but never ſaw the Bees take any thing from the *leaves*; the *flowers* indeed they were greatly enamoured with, and enriched themſelves with their nectar. How, where, or from what they collect the valuable article of wax, ſeems yet a myſtery. I am inclined to think that they ſuck it from flowers into their ſtomachs, as they do the honey, and carry it thus into their hives, and then apply it to the in-

tended uſe, warm and pliable as it comes from that organ. For in places where conſiderable quantities of white poppies bloom, the combs made at that time are remarkably *white*, and extenſive combs will be formed in a much ſhorter time than uſual; nor is this remark wholly my own, ſeveral Apiators having noticed the ſame.

533. When there are large fields of white clover, near an Apiary, and the bloom not cut off, the hives will be filled in a ſhort time.

534. Large woods near a Bee-ground are of very great ſervice: not only on account of the plenty of farina they afford, but alſo of the honey dews; for there being a great number of trees ſo near each other, a large quantity of that article is neceſſarily gathered in a much ſhorter time than it could be from the ſame number of trees ſcattered through the diſtance of perhaps ſeveral miles.

That the nearer and more plentiful all the honey paſture is, the more journies the Bees can make in a day, and conſequently collect a larger quantity, is a propoſition that ſeems ſelf-evident.

535. It has been ſaid, that Bees will fly three miles for paſture; be it ſo; you will not diſpute, however, that if they had but three rods or three yards, they would fill your hives much ſooner. If Bees will uſually fly ſo far for provender, how comes it to paſs that ſo many Stocks periſh for want, when it has been well known that at half a mile diſtance they might have collected honey in plenty?

or how is it that poor Stocks on being removed, not more than that diſtance, have preſently become rich, and filled their hives? I queſtion whether they ever traverſe for food in ſpring or autumn more than a quarter of a mile.

536. In Egypt and other eaſtern nations, it has been a practice to remove Stocks of Bees in waggons or in boats from one place to another, even to a very great diſtance. As faſt as the flowers fail in one encampment they proceed to another, through the whole ſeaſon. Something of this nature has been attempted in France, where, perhaps, it may have proved ſucceſsful; but from the inſtability of the Engliſh climate, the advantage ariſing from ſuch a ſcheme here would not be adequate to the expence.

537. Whether it would be eligible to cultivate a field or large ſpot of ground, with plants purpoſely for Bees, is at preſent doubtful, becauſe all the neighbouring Bees, and numberleſs other inſects, would become equal ſharers of the proviſion; but notwithſtanding this; if the increaſe of honey ſhould prove conſiderably greater than it would otherwiſe have been, and of more or even equal value with any crop that might have been raiſed on the ground, it would be a very eligible practice for many farmer sto adopt; not only as a valuable change to many pieces of ground, but for the improvement of ſuch as would otherwiſe from their natural poverty be good for little, and yet might produce a rich crop of Bee-flowers,

viz.

viz. Borage, buckwheat, ſainfoin, tares, and white clover. Buckwheat is often ſown to be afterwards plowed in as manure; but by this management it would be made of double advantage; as might alſo white clover, by letting it ſtand for ſeed, which is valuable and chiefly imported from Holland. Sainfoin and tares may likewiſe be cultivated for the ſame purpoſe, and with a ſimilar advantage; whereby there will be a two-fold crop, one of honey, from the flowers (which muſt not be cut) and another from the ſeed.

538. It is referred to the judgment of the experienced, whether the value of the honey and ſeed would not be more than adequate to that of mowing a particular field or two for fodder. How far this ſcheme may be generally practicable, I will not determine; but at any rate it cannot be an unprofitable ſtep to appropriate, in large extenſive gardens, ſome poor or mean ſpots for the cultivation of Bee-plants; for though other Bees will undoubtedly participate, yet from the greater vicinity of the flowers to the Apiary, your own Bees will collect by far the greater ſhare of honey, &c. being enabled by their taking ſhorter journies, to make much quicker returns; and therefore, though you cannot reap the whole advantage, you will certainly benefit conſiderably more than if no ſuch proviſion had been made. Moreover, if the neighbouring Bee-gardens be equally well furniſhed; the advantage will be mutual, and the

Stocks of the whole circuit abundantly improved.

539. One plant in particular, and to which few people have any diſlike, deſerves peculiar encouragement, as it affords in the fruit a very agreeable repaſt for themſelves, and in the flowers for the Bees; I mean the *Strawberry*, of which I have many beds; they are raiſed high and laid oval: no pains are taken with them, but drawing out any weeds that may appear. Theſe plants, though growing in a manner wild, afford as much fruit as thoſe upon which much time and care have been beſtowed.

540. One remarkable circumſtance remains to be unfolded; which is, that of all the *fruits* raiſed by us, I know of none except the amber gooſeberry, that the Bees will feed on, but of this, when left upon the buſhes until dead ripe, they will devour the pulpy part in the ſame manner as waſps do.

541. When Stocks have had an extraordinary day of honey-gathering, they ſeem as it were to praiſe the Deity for his bounty, in a full and joyful chorus, eaſily diſtinguiſhable by attentive Apiators. The ſame may be obſerved when they have been ſo ſucceſsful as to have filled their hives, great numbers having then no more work to do, are ſeen to friſk about full of ſport and play before their city gates: but the idle and the epicure Drones undergo a ſad reverſe, a diſmal fate; for they muſt now no longer partake of that delicious food

which others have induſtriouſly accumulated with ſo much toil and labour.

542. Water is abſolutely neceſſary to Bees, but as our climate is generally charged with moiſture and dews, there are perhaps but few places that require any water to be ſet on purpoſe for them; except in a very dry ſeaſon; or if there be no pond near the Apiary. In this caſe the public feeding troughs (760) filled with water, will anſwer the purpoſe; or broad ſhallow pans filled with ſmall rough ſtones, and the water poured among them: Theſe will enable the Bees to ſtand and ſip, without danger of drowning, which otherwiſe they would be liable to. Ponds covered with duck-weed are very convenient to the Bees, as theſe weeds will buoy them up ſo as to enable them to ſip with ſafety.

543. Let us now endeavour to inveſtigate what number of Stocks may be kept, ſo as to give the moſt profit, and from thence draw ſome inferences with reſpect to the emoluments accruing to the proprietor.

544. For this purpoſe a review of what has been ſaid by former writers on this ſubject, will furniſh us with ſome uſeful information.

545. Ruſden relates, “ That on the 21ſt of “ June 1677, a colony being weighed, it was “ fifty-five pounds, and on the 28th of June “ it weighed eighty-five pounds, which was “ an increaſe of thirty pounds in ſeven days. “ But in the ſame ſpace of time a ſingle Stock “ or Swarm can ſeldom increaſe five pounds. “ The reaſon is, the colony having but *one*

“ brood, can ſpare moſt of the working Bees. “ But the Stock or Swarm having *each* of “ them a young brood, when the harveſt of “ Honey-Dews comes, they being ſeparate, “ cannot ſpare ſo many labourers, in proportion as the colonies; nor have they a ſufficiency of vacant combs to put the honey “ in, the chief part being filled with brood. “ Neither are the colony Bees obliged to go “ abroad in bad weather; as are the Stocks “ or Swarms, whereby many are loſt.”

546. Ruſden's boxes were ten inches high, and ſixteen inches over, on the outſide: “ One of theſe, (he ſays) taken from a colony generally weighed fifty-ſix pounds, “ while Stocks only weigh twenty-eight “ pounds.” (Here he is certainly miſtaken, I have bought many farmers Stocks, that have weighed forty-five pounds and upwards): but he ſubjoins, “ Or a Stock that “ has not ſwarmed forty pounds. A colony “ alſo will have one fifth part more good “ honey: nor do they put their honey into “ thoſe cells that have had brood in, as “ Stocks and Swarms are obliged to do.”

547. “ But ſuppoſing the Swarm left as a “ balance to the worth of the colony (which “ it doth not near do) then the Stock taken “ up will not weigh half that of the colony “ taken off, beſides the ſuperior goodneſs of “ the honey.”

548. He obſerves in another place, “ That “ he took ſome colonies off that year of fifty-ſeven pounds, ſixty-one, and ſixty-four

" pounds weight each, ſo that colonies turn " out more than doubly profitable, and have " more virgin honey than three ſtraw hives." He uſed three boxes to each colony.*

549. The Reverend Mr. Thorley mentions, that in ſome ſummers he has taken two boxes from one colony, each weighing forty pounds, and left ſtore enough in the other for their maintenance (his boxes were ten inches deep in the inſide, and the breadth twelve or fourteen inches), diſcounting therefore ten pounds, for the weight of box and wax, there will be 60lb. left for the proprietor, and the greater part pure virgin honey. This gentleman's ſon informs us, that in a good ſeaſon he has had (at Ball's Pond, near Newington-Green) a glaſs globe filled in thirty days, containing thirty-eight pounds of fine honey.

550. Dr. Warder,† of Croydon, gives us no calculation of the profits of his boxes; but to thoſe who keep Stocks in the uſual way, his advice is worthy of remark. In order to become a wealthy Apiator, he adviſes, " to " begin with ten good Stocks, at ten ſhillings " a Stock (though in ſome counties they are

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* *The word Colony conveys no idea of a Stock of Bees, that is kept from ſwarming; but quite the reverſe. Much leſs can we conceive that thereby is only meant a Stock raiſed three ſtories high. A Swarm might properly be called a Colony, had they no ſupreme head; but the inſtant they are ſettled, they become an independent empire.*

† *True Amazons.*

" much cheaper). The firſt year by doub-
" ling your Caſts, you will be able to have
" about twenty-five good Stocks, and the next
" year about ſixty, and the third year about
" one hundred and fifty, barring caſualties,
" and they prove good years; ſo that when
" you have raiſed this Stock, you are rich
" enough, if not over covetous. Should
" there come good weather, you may have
" about one hundred and ſixty Stocks to
" take, which, at five ſhillings a Stock, good
" and bad, comes to forty pounds; a good
reward for the pains taken with them.

551. Here the woman with her baſket of eggs, ſpontaneouſly intrudes upon the mind. This ſpeculation ſeems the reſult of the Doctor's calculations in his ſtudy; for it is much to be queſtioned whether ſuch a rapid increaſe has ever been found in England.

552. However, I think we may ſafely remark upon the whole, that the ſituations in which theſe ſeveral gentlemen made theſe very great profits, muſt have been of the extraordinary kind; and withal but few or no Apiaries in the vicinity to participate in the paſturage.

553. The profeſſor Wildman has given us no eſtimates of this kind, and therefore I may proceed to ſay ſomething of my own Apiary, which could never furniſh near ſuch a quantity of honey as above related; nor will my ſituation ſupport more than eighteen Stocks, and ſome years not even twelve.

554. It muſt be a very good year, and a very good Stock, to afford me a box of twenty-

five pounds. Nor will the run of Stocks in this neighbourhood yield upon an average above ſixteen pounds of honey each.

555. If by raiſing your Stocks you are ſo lucky as to keep them from ſwarming, the number of Bees in each will conſequently be very great; and ſhould it prove a favourable ſeaſon for honey-gathering, a great quantity will be collected in a few days; for as according to the old adage, "Many hands make light "work," ſo two pecks of Bees in one hive, will procure twice the quantity of honey than if the ſame number of Bees had been divided into two hives. The more Bees together the greater their proſperity.

556. That colonies, or in other words, Story Stocks well conducted, will yield far greater advantage in every reſpect than common hives, in ſimilar ſituations, muſt be readily acknowledged by every judicious perſon who ſhall have tried both.

557. But neither Warder nor Ruſden have given us any directions for diſcovering what ſituations are favourable for this prodigious increaſe; nor made any allowance for the many deductions that muſt be made for the loſs of Stocks in the winter and ſpring; nor for thoſe years in which little honey can be obtained; nor for the unavoidable ſwarming of colonies, notwithſtanding every precaution.

558. I am not converſant with heath countries; but it ſeems improbable, that any of them can poſſibly allow of ſuch a rapid and prodigiouſly great increaſe as Warder ſuppoſes. Our climate is too change-

able and unfavourable for it. And if we have one good year in three for Bees, it is as much, as upon an average, we can boaſt of. The mildeſt of our ſeaſons are checquered with too much variety to be very proper for this nice buſineſs: ſo that it may be ſafely queſtioned whether Ruſſia's much ſeverer clime, be not more propitious.

559. In Spring and Summer it frequently happens that the day cloathed in the brighteſt ſplendor, and with its genial warmth gladdening the hearts of men and Bees, ſhall ſuddenly become cold, wet, and gloomy. In ſuch inauſpicious weather the Bees, compelled to ſtay at home, will quickly conſume as much honey as they had laboured for in the preceding fine days. Should theſe unfavourable tranſitions be frequent during the honey harveſt; eſpecially at the time of the Honey Dews falling, farewel plenty! Want! conſuming Want, throughout the winter, will be the portion of theſe uſeful and induſtrious inſects; and will inevitably deſtroy them in the Spring, unleſs timely relieved by the foſtering hand of charity (733, 752).

560. The Reverend Mr. White obſerves, that the village in which he dwelt, though a large one, would only ſupply ten colonies; and yet his boxes were leſs than a peck meaſure.

This village was ſurrounded with beautiful meadows and fine gardens. Whereas, in the adjoining county of Cambridge abounding with extenſive barren heaths, which allow ſcarcely any flowers to ſpring up and bloſſom; here is ſuch a profuſion of honey, that he had een 70 or 80 hives in one farmers yard, even juſt after the burning-time. And this, notwithſtanding the inundations of the fens, the farmers plough, or the numerous flocks, that graze on thoſe almoſt barren heaths. To which we may add, that the ſame circumſtances are obſervable in Hampſhire and Wiltſhire.

561. The village from which I write has a great affinity to that deſcribed by Mr. White: and yet, about a mile from hence, upon the environs of a very extenſive common, and ſkirted with ample woods, Bees thrive amazingly.

562. Marſhy grounds are very unfavourable to Bees. I have known ſome that did not thrive on ſuch, but on being removed about a mile to a higher and drier ſituation, ſoon became ſtrong and well repleniſhed.

563. Should ſeveral neighbours vie with each other, who ſhall keep the moſt hives, it will impoveriſh the Stocks of all.

But although this may happen to be the caſe in ſome few places; yet England is in general very thinly ſtocked with Bees. Should every farmer and cottager, however, keep a few, all the honey and wax the flowers could poſſibly yield, would be as regularly collected as the apples of the orchard, or the wheat of the fields; and prove a great advantage to themſelves, and the kingdom in general.

564. Moſt of the cottagers throughout the iſland, with a very ſmall portion of trouble, and at a very little expence, as has been ſhewn, provided their Bees be managed properly might half maintain their families by the profits. Many of theſe labouring people keep poultry: which, though requiring both much

attention and expence, prove but little advantage to themſelves, and of great detriment to the farmers. Bees, however, few of them will keep, tho' demanding much leſs attendance, much leſs expence, and yet, when properly managed, will yield twenty times the profit. How prepoſterouſly abſurd is ſuch conduct!

565. Though in ſome ſituations very great profits cannot be made: yet in all a profit may be obtained ſufficiently adequate to the time and expence beſtowed on theſe induſtrious ſervants, by their no leſs induſtrious and humane maſters and protectors.

566. From the principles laid down, we may infer, that the number of Stocks of Bees muſt be limited according to the nature of the ſituation: and that a place or diſtrict may be over-ſtocked in the ſame manner as paſture for ſheep. For if twenty of theſe be confined to a paſturage that will ſupport but ten, what elſe but poverty, leanneſs, and even death can be expected. So, if an Apiator keeps twenty Stocks of Bees, though he finds year after year, many die in winter for want, and the reſt but ſcantily provided; it muſt be folly, not to take the *hint*, and reduce them in future to half the number.

CHAPTER XVI.

Of HONEY DEWS.

567. THE Honey Dew is not a liquid depoſited by the air on the leaves of plants, as is generally ſuppoſed: For then, like other dews or fogs, it would fall on,

and adhere to all ſorts of plants indiſcriminately, whereas, it is found only on a *few* particular plants; and on them but partially, for the young leaves afford none.

568. The oak, maple, ſycamore, hazle, and bramble, are, as far as I can find, the only plants on which it is found. Neither is it diſcovered like other dews, early in the morning: But ſome hours after the ſun has ſhone with its greateſt ſplendor, that is about ten or eleven o'clock; and continues, more or fewer hours, in proportion to that ſplendor. For cloudy, dull days are incompatible with Honey Dews. This ſubſtance is as tranſparent and as ſweet as honey, and is in fact, perfect honey, attracted through the pores of the leaves, by a peculiar ſultry heat; particularly when reflected through clouds. Sometimes it is found on the leaves in the form of little drops or globules. But at other times being more diluted, by the greater moiſture of the atmoſphere, it covers the leaves, as though they were ſpread with a fine ſyrup.

570. The time in which theſe Honey Dews are generally found, is from the begining of June to the middle of July. But it will vary in proportion as the weather is wet or dry; which will occaſion them to be either ſooner or later. The hotteſt and drieſt ſummers, produce the largeſt and moſt frequent Honey Dews. In cold and wet ſeaſons, few or none of them are to be ſeen When the year is backward in its fruit, it betokens that the Honey Dews will be late alſo; ſometimes, even ſo late as the middle of harveſt.

571. Butler has a remarkable obſervation upon this ſubject; Honey Dews he ſays, were in the year 1617 produced two months after the uſual time. There having been a long continuance of wet weather, no Honey Dews were found until the latter end of Auguſt; which proved exceedingly hot. But the quantities were ſmall and of little ſervice. For the Stocks when taken, proved light: and moſt of the Stocks and Swarms that were kept, died for want, before the end of winter; excepting only in the heath countries; were the heath being then in full flower, afforded the Bees that plenty of honey which could not be obtained from the Honey Dews.

572. Whenever a Honey Dew is found, the Bees are ſo extremely eager to fetch it, that they quit all other work, that their returns may be the quicker and more numerous; and leſt a gloomy change ſhould deprive them of the precious prize. No harveſt ſwain, dreading impending ſtorms, can be more anxious, or expeditious, in haſtening the houſing of his crops than theſe aërial tribes in this their delightful office; ſo much ſo, that thronging in too great numbers at the door-way, they joſtle and tumble each other down. And ſmarting woe to thoſe who ſhall thoughtleſsly ſtand in their way at this important criſis. Their joy on theſe occaſions, is expreſſed in ſuch inceſſant and loud notes, as to be heard at a great diſtance. By theſe tokens it may

be known there is a Honey Dew, without ſeeing the trees from which they gather it.

573. The Bees of ſuch Apiaries as are far diſtant from thoſe plants that produce Honey Dews, cannot collect near the quantity that thoſe can that are near. Gardens in particular, ſeldom furniſh plants of this ſort.

574. A very ſurpriſing ſource of honey was obſerved by the Abbé Boſſier in France. This he tells us, the Bees collected from the excrement of a ſmall inſect called a Puceron, vulgarly a louſe, infeſting the bark of ſome particular trees; ſuch as holm-oak and the lime. In the middle of ſummer they furniſh the moſt of this excrementitious ſweet: In the Autum (tho' that is the time the Bees have moſt need of it) but little, and of inferior quality to honey gathered from flowers.

575. As I was ignorant whether any thing of this kind had ever been noticed in England, and as there are both oak and lime trees on my premiſes, I have from year to year, very attentively obſerved them; but could never perceive any ſuch appearances as deſcribed by the Abbé; I muſt therefore leave this matter to be aſcertained by ſome one who ſhall be more ſucceſsfully inquiſitive.

CHAPTER XVII.

The Method of Separating DOUBLE HIVES *or* BOXES; *and of taking the* HONEY-COMBS, *and* HIVES *in general; with many Obſervations and Precautions relating to* STOCKS *during the Summer.*

576. HAVING accommodated the Bees with the moſt convenient and proper neceſſaries for the growth and preſervation of their families, and increaſe of their treaſure, it is but reaſonable that as a requital for this trouble and expence, we participate with them in the profit; therefore to ſhew how to obtain this to the greateſt advantage, is our preſent taſk.

577. Stocks that have emitted Swarms, in general will not afford an extra box or hive of honey that ſummer; nor can it be expected from Swarms; unleſs in both caſes the Bees be very numerous (a peck at leaſt), or the ſeaſons and ſituations very good.

578. The proſperity of a Stock depends much upon the Drones: for if theſe be deficient in number, or not born until late in the ſummer, the increaſe of your Bees will be

proportionably limited: on the contrary, if they be too numerous (418, 580) they will devour the honey ſo faſt that the Workers can hardly keep a *ſingle* hive ſupplied, much leſs fill an additional one (830).

579. When the Drones have been too few in a Stock, I have watched their coming out from other Stocks that ſeemed to have too many; and taken ſome of them away with my finger and thumb. I have put a dozen or two of theſe, having previouſly cut off one of their wings, or wetted them, to prevent their flight, to a droneleſs Stock, where they were kindly entertained. The Stock preſently afterwards was greatly improved.

580. On the contrary, when they are too numerous, they may be deſtroyed by the finger laid on them as they riſe from the reſting-board (582). Great diſcretion however is neceſſary, leſt too many be killed; for this will prevent a proper increaſe of young; and alſo the Queen's being ſufficiently impregnated to produce a brood the next ſpring.

581. When their numbers are moderate, the working Bees themſelves will deſtroy them the latter end of July or beginning of Auguſt; according as the ſeaſon may have been: for about this time honey-gathering failing, and the Queen having no further occaſion for their ſervices, a general maſſacre is ordered; though ſometimes this is not executed all at once, but gradually. Heaps of ſlain may be ſeen before ſome hives, while before others very few, the reſt being expelled.

This only protracts their fate a few days, when famine, inexorable famine, terminates their exiſtence. At this fatal period the Workers keep guard at the door-way, that none may re-enter their once bliſsful habitations.

582. Sometimes it happens, though the inſtances are but few, that the Drones are ſo very numerous that either the other Bees would not, or could not attempt any violence againſt them; in conſequence of which ſo much honey is devoured in autumn as to impoveriſh the Stock, and occaſion its deſtruction.

583. To remedy this evil, when the other Stocks kill their Drones, quietly place yourſelf by the ſide of the door-way, in the middle of a fine day, and cruſh every Drone with your finger as they paſs out or in. By this means a great number may be killed in a ſhort time; but it muſt be done without flurry or hurting any of the Workers; for ſhould this be done, though by chance, it will enrage them ſo much that it will be beſt to leave them a while, and to reſume the taſk an hour or two afterwards. Or a piece of wood may be fixed before the door-way, and a part of its bottom edge cut out deep enough to admit the Workers, but not the Drones: thoſe that happen then to be out muſt remain ſo. In the evening, the working Bees being all within the hives, the Drones that are without ſide may be eaſily deſtroyed. The board muſt then be taken away, and re-fixed in the courſe of the next day, and in the evening

the ſame operation is to be repeated. Two or three times will probably be ſufficient to deſtroy the whole; or, at leaſt, ſo leſſen their numbers as to give the working Bees a great ſuperiority, and encourage them to deſtroy the now uſeleſs Drones.

584. But in general the killing a few by the hand, will excite the Workers to finiſh the cruel but neceſſary buſineſs. Sometimes the ſeparating of double hives will have the ſame effect; the diſturbance putting them in a paſſion, they will vent it upon the defenceleſs Drones.

585. Thoſe Stocks that ſooneſt expel their Drones, will increaſe greatly in honey, and be the boldeſt and ſtrongeſt in defending themſelves againſt all their enemies: and alſo generally produce the earlieſt Swarms.

586. It being now time to reap the reward of all our care and patience, it becomes neceſſary to give ſuch information as will enable the Apiator to know when a ſtraw-hive is full, and fit to be taken. To judge of this, ſtrike in the evening with your fingers all round upon the hive; if at the firſt or ſecond ſtroke a great noiſe is made, and continued for a conſiderable time, you may be ſure it is full of Bees; and if upon ſtriking all round the hive, and near the bottom, it feels ſolid to your ſtrokes, you may conclude is it alſo full of honey: on the contrary, if it ſounds hollow, it is not full, and muſt remain longer, or even until honey-gathering be over. When the Bees on ſtriking make but little noiſe, and

that only for a ſhort time, it ſhews there are but few: nevertheleſs if it has ſigns of being full of honey, it ſhould undoubtedly be taken; for if permitted to ſtand, it may be aſſaulted by robbers in the autumn, or the Bees may periſh by cold in the winter.

587. When a box is placed under another, and ſome combs are made therein, the Queen commonly ceaſes to lay her eggs in the upper, and begins to depoſit them in the under box; about three weeks after which time the upper ſtory will be deſtitute of brood. It is not however to be then taken, becauſe time muſt be given for the Bees to fill the vacant cells with honey; and alſo, nearly to fill the under box for their winter ſtore: otherwiſe, the upper full one being taken away, ſhould the honey harveſt preſently fail, the Stock will be left unprovided, and muſt periſh through famine before the next ſeaſon.

588. But the Queen will continue often to lay both in an under and upper box or hive; being very unwilling to leave her old familiarized apartment. When hives therefore are taken with brood in them, great circumſpection muſt be uſed in ſeparating thoſe parts of the combs that have brood; theſe muſt be put into an empty hive, and placed over or under the Stock, as may appear moſt convenient. In boxes or hives with windows, it may be known in which of them the Queen is, by introducing the ſliders as ſoon as an additional one becomes full. Leave them an hour or two, in which time, if

either of the boxes have not a Queen, the Bees of that Box will be in the utmoſt hurry and confuſion: but if there happens to be a Queen in each, the Bees of both boxes will be quiet, and the additional one may be taken off and kept as a Swarm. If there be only one Queen, and ſhe in the old bottom hive, ſtop up the door-way, and withdraw the ſliders, which will induce her to aſcend, and make the upper one her reſidence; but for greater certainty ſtop the bottom door-way, when a box is firſt ſet on; this will not give the Bees any extraordiuary labour; for their way will be as ſhort down into the box, as up by the door-way. If after all ſhe is ſtill in the old box at taking-time, drive the Bees into an empty hive, and ſetting the door-way of that againſt the door-way of the virgin box, they will unite without further trouble.

590. I have taken at the latter end of Auguſt, both the under and upper hives of a Stock that had been raiſed three ſtories, which yet had brood and farina in both, the upper and under door-way being left open; and the ſame in other years, though the upper door-way was cloſed up. Therefore ſuch large ſtraw hives as have been raiſed, had better be left until the uſual time of taking, as then there will be the leſs riſk of their having brood.

591. The ſeparation of hives or boxes, when ſtored with honey-combs, is the moſt difficult part in the management of Bees. This has given me no little perplexity for

ſeveral years; as I endeavoured to find out a method, not only of performing this very difficult operation with eaſe, but alſo with little or no additional expence. After a variety of experiments, however, I was ſucceſsful enough to hit upon three methods of operating, all of them ſufficiently practicable, and which I here offer to my reader's choice.

592. The implements uſed in the firſt method are, a double tin-plate made ſixteen inches long and ſixteen broad, by having a ſlip neatly ſoldered on, and as even and ſmooth as poſſible; one end of it ſhould be turned over a wire that it may not hurt the hand, when ſhoved between the hives. Or milled iron, of the thickneſs of the tin, may do. Alſo, two ſaws, of about four or five inches wide, which are elaſtic, and at the ſame time of a proper ſubſtance for our purpoſe, without caſting. A cloth to throw over the hive, an empty hive, and alſo a chair-frame, pail, tub, or the like; ſhould all be in readineſs.

593. If it be a hive or box that is to be taken off, juſt after dark, ſtop all the doorways and thruſt in the ſliders to the under hive; then ſhove the tin-plate between the upper and lower hive, as gently as poſſible, and if it is not in a houſe, keep your left hand in the front, to prevent the hives from ſliding out of their place. Thruſt the ſaws under the plate, one on each ſide, until the edges are even with thoſe of the tin. Lift up the whole together, at the ſame time ex-

tending your fingers as much as poſſible under the ſaws, to keep them cloſe up to the tin both before and behind in order to prevent its caſting, or being hollow: which it will do without the ſaws, and thereby would let the enraged Bees out, in great numbers, greatly to your and their prejudice, all which the ſaws prevent.

594. As ſoon as it is taken off, ſet it leiſurely upon a board or hive floor, and take it to ſome out-houſe; then turn it upſide down, upon a pail, &c. floors tin and ſaws altogether, without looſening them in the turning; take off the board with one hand, at the ſame inſtant extending your other hand over the ſaws and tin to keep them cloſe down, until you have placed an empty hive with the door-way previouſly ſtopped over it. Keep them ſteady while you withdraw the ſaws, then holding your left hand firm upon the hive with the other drum about four or five minutes, then take away the tin, and drum again until you hear by the buz that the greater part are aſcended. There is ſome nicety in the management of the ſaws, but a little practice will make it very eaſy: and what is more, not a Bee can come out to hurt you. Tho' on peruſal this may ſeem tedious and difficult, yet I have felt more difficulty in giving this deſcription than in the performance itſelf.

595. If there be any brood in the combs, theſe are to be cut out, and ſo placed in an empty hive, which has bars or openings, that

when the hive is inverted the combs may lean ſlanting againſt the ſides, and not flat againſt each other. The hive is then to be placed over the Stock. If there be any fragments of combs or honey upon the top of the Stock, they muſt be ſcraped off firſt, and then the ſliders withdrawn. But when there is no occaſion to ſet a hive over the Stock the cover is to be faſtened on before the ſliders are taken out.

596. When a hive is taken off, it ſhould not be carried near the dwelling-houſe, for the next day the Bees will come in great numbers to ſearch for their ſtolen treaſure, and be very troubleſome viſitors; many of them will be alſo loſt in the purſuit.

597. This operation may be performed in the day-time; but the Bees that are returning home, ſeeing the diſturbance, will become cloſe enquirers of what is doing; as will alſo thoſe of the other ſtands, ſo that one or two Stocks will be the moſt any one can poſſibly manage without being armed cap-a-pée. Boxes in a houſe, may however be taken by day-light without much inconveniency.

598. In order to render the ſaws unneceſſary, plates both of iron and pewter have been tried; but to preſerve their evenneſs or level when uſed, they were obliged to be made ſo thick, that on introducing them between the hives, the Bees were greatly more enraged, and at the ſame time had ample opportunity of iſſuing out upon the Apiator.

The tin-plate, being ſo thin, readily cuts its way and ſeparates the combs with greater nicety and with leſs umbrage, than can be done by a knife or any other inſtrument; at the ſame time confining the Bees as it paſſes.

599. If a bar three inches wide be fixed in the middle of the bottoms of the hives, correſponding to the middle bar of the tops; it will render the tin-plate unneceſſary; for the ſaws, when thruſt in at the ſides, will reach to the bar, and thereby cloſe the whole bottom up. But that end of the bar that is to be next the door-way, muſt be ſpread dove-tail ways, and be bevilled down to a feather edge, otherwiſe it will ſtop up the door-way.

600. My ſecond mode of ſeparation is performed by a thin wainſcot board; which muſt not be thicker than a quarter of an inch. It is to be of the ſame dimenſions as the tin-plate (592). At one end a thin ſharp piece of iron or ſlip of tin is to be let in, and faſtened down, but muſt extend or project about half an inch beyond the board. To this muſt be added a piece of coarſe linen, eight inches wide, and ſufficiently long to go round any hive or box you uſe, and leave about ſix inches over: At one end of this cloth, and near the edge, a wire hook is to be fixed, in order to faſten it and keep it tight when extended round the hive. This is the whole of the apparatus.

601. When about to uſe it in taking off or ſeparating a hive or box, let the cloth be

previouſly made pretty damp; then ſtopping up the door-ways of the Stock you would ſeparate, draw the *edge* of the cloth round the ſkirt of the hive, within one or two rounds of its bottom, and faſten it tight with the hook. The intention of wetting the cloth is, that whenever the hive be lifted up it may drop evenly down. An aſſiſtant is then to lift the hive up, (firſt giving it a little twiſt, to looſen the combs from the under hive) juſt high enough to admit the boards being ſlipped under it. In doing which great care muſt be taken, not to ſlide it againſt or to intangle the cloth, but to paſs freely under it, the bottom edge of the cloth, hanging upon the board as it paſſes. By this means, though the hive be lifted ſo high that the Bees might eaſily eſcape, yet the cloth, like a hanging curtain, falls upon the board ſo cloſe all round, as to prevent their paſſing. The chief nicety of the operation is in the firſt introduction of the board: Be careful therefore to lift up the cloth a little and clap the end of the board to the joining, where it is to be introduced; ſet down the cloth upon it; the aſſiſtant is then to proceed as above directed. As ſoon as taken off it is to be treated in the ſame manner (594).

602. But it would be better if this board be made ſo as to receive a braſs-wire net-work about ten inches ſquare, with the meſh not wide enough for a Bee to paſs through it, and let into a rabbett, and tacked

thereto with ſlips of tin to keep it faſt and ſo as not to riſe above the level; it will then be very convenient for the inſpection of ſuch hives as have no windows; for by ſetting the board upon the frame of a chair, or ſtool, by the ſide of the ſtock, then ſtopping up the door-way of the hive, and lifting it off upon the board, you may eaſily peep underneath and inſpect it as long as you pleaſe with the greateſt ſafety. Or you may turn it upſide down, to inſpect it. After you have ſatisfied your curioſity, the door-way is to be unſtopped, and at night the Stock placed on the ſtand again. Or, it may be lifted thereon as ſoon as you have done.

603. It may likewiſe ſerve for the ſame purpoſe in aſcertaining the ſtrength of Swarms, and in purchaſing Stocks or Swarms. So that conſidering the very trifling expence of this whole apparatus, its ſimplicity and extenſive uſefulneſs, together with its great durability, when taken proper care of, it may perhaps with juſtice be eſteemed the beſt adapted for performing the ſeparation by day-light, and as perfect as the deſign will poſſibly admit of.

604. But thoſe who do not chooſe to be at this expence, may have cloth of ſufficient dimenſions to draw over a hive, with a circle of about ten inches cut out of the middle; and any kind of net or open work, that will not permit the Bees to paſs through, ſewed therein; this will anſwer every purpoſe, except *ſeparation.*

605. The laſt proceſs we ſhall particularize ſurpaſſes even the foregoing, both in the facility of the execution, and as requiring no expence for inſtruments.

In order to ſeparate an upper hive, on the preceding night cloſe up the door-way with a rag; and then run a thin long knife between the hives, as far as you can, ſo as to looſen the combs from the under hive. This indeed will ſomewhat irritate the Bees; but their anger will ſubſide before the next night; and the operation will be greatly facilitated by it. The next night lay a cloth upon the ground before the Stock you want to ſeparate, and ſtop up the door-way with a rag; then have a board or looſe floor ready placed by the ſide of the Stock; and, after thruſting in the ſliders, give the hive a little twiſt, lift it up, and ſet it upon the board or floor. Immediately with a knife or piece of tin, ſcrape from off the bars ſuch Bees and pieces of comb, as may be thereon, towards the front of the hive; ſo that they may fall on the cloth. By this management the looſe Bees will be preſerved. The cover is then to be put on as quick as poſſible, and the ſliders taken out; and the hive that is taken off, to be removed to an out-houſe. In the ſame manner treat as many more as you want to ſeparate; ſetting them in rows, or marking them firſt, that you may readily know to which Stocks they reſpectively belong.

606. In the morning, take the firſt and drive them into an empty hive; and as ſoon as this is done, ſtrike them out again upon a cloth placed before the hive they belong to; one end of the cloth being alſo tacked up to the reſting-board, by which they will crawl up, and re-join their companions. Then proceed to the ſecond in the ſame manner, and ſo of the reſidue.

607. But if the operation be performed in fine ſettled weather, inſtead of removing them into an out-houſe, turn them upon their ſides, (upon chairs or the like) with their bottoms or open ends to touch the reſting-boards of the Stocks; and before morning moſt of the Bees will have deſerted their own hive and got to the main Stock, without driving, Thoſe that have not, muſt have a cloth thrown over them, and be taken to a conſiderable diſtance, or to an out-houſe and drove (372). It will be neceſſary to obſerve the rules relating to the probability of there being ſeparate Swarms among them (401.)

608. Here I would remark that after ſeparation, the Bees are ſo terrified, that when turned out, they will readily paſs into another empty hive and there remain ſeveral days, until their terror is abated, though no Queen be with them. Nor will Bees quit a hive ſtored with honey or brood when ſeparated, unleſs by force; or by being left ſeveral days, in which time much of their honey will be conſumed by them; or by

neighbouring Bees, Waſps, &c. ſo that force or ſtupefaction is the only eligible method.

As thoſe Bees which eſcape during the operation, will cluſter together about the place where it is performed, they ſhould be gently bruſhed off as often as they ſettle: but if this be not done, they will return home either the ſame or the next night.

609. If *under* hives are to be taken, lift off the whole together, and ſet them on a proper ſupport cloſe by. Then placing a freſh floor on the ſtand, lift up the upper hive, and ſet it thereon. The hive left, muſt be managed as thoſe before-mentioned (607).

610. Should a Stock be ſo full of Bees, after having been ſeparated, as to lie out, ſet an empty hive over them until the latter end of September; at which time great part of the brood having quitted their cells, and the nights being alſo cool, they will all readily go into the under hive; the empty one ſhould then be taken off.

611. It muſt be very obvious to perſons converſant with Bees, that nothing ſo much enrages them, as being robbed of their well-earned treaſure; conſequently to attempt it at a time when they are moſt vigorous and irritable, even in the face of the ſun; muſt be attended with much more difficulty and danger than when they are ſurpriſed in the chill of the night, and under the maſk of darkneſs, and when they

are incapable of ſeeing the invader. The buſineſs alſo is generally over in this caſe before they are recovered from their conſternation.

612. Collateral boxes are ſeparated with more eaſe than ſtory boxes, as having bars and ſliders to each; whereby the Bees are ſo confined that not one can come out. But if a looſe bottom frame be made to the ſtory boxes with bars ſimilar to thoſe of the top (124), there will be no pre-eminency in this point, on either ſide; for in both ways, unleſs very great care be taken to cement the joinings, the moth will certainly breed between, and endanger the Stock.

613. It is poſſible that by ſome miſmanagement, or accident in ſeparating, the Queen may be killed; (though I have ſeldom met with ſuch a miſchance). This may be diſcovered by the tumult of the Stock Bees In ſuch a caſe it will be beſt to *unite* them to ſome weak Stock, if it happens not to be later than the middle of July, that they may have time to repleniſh the hive. But otherwiſe, unite them to a well furniſhed Stock for the winter.

614. I have tried to take honey in a ſimilar method to that of the Greeks, as related by Sir George Wheeler. This on reading ſeems indeed very ſimple and eaſy; but whoever ſhall make the attempt will certainly find it both extremely troubleſome and dangerous; and indeed not to be done, unleſs

compleatly armed. But inſtead of any of theſe methods, that of ſtupefaction, beforementioned (389) may be uſed; as the Apiator ſhall find moſt eligible and agreeable to his own ideas.

615. Whoever would wiſh to make the moſt of their Bees, ſhould never let them be in want of room; for whenever additional hives ſeem full of honey and crouded with Bees, they muſt be taken off, and others, or glaſſes, ſet on, as long as there is plenty of honey paſture, that no part of the honey harveſt may be loſt. Whenever Bees croud about the door-way, and ſeem idle (after ſwarming-time is over), it is a ſure ſign they want enlargement.

616. In common hives this advantage is intirely loſt, eſpecially, where the ſituation is very good, and the ſeaſon favourable; for when the hive is once filled, the Bees can do no more; and therefore, take their pleaſure and are very joyous. Many country people, have not even the ſagacity to raiſe them by an ekeing or lift, (499). Nor indeed can thoſe cots that have ſhelves one above another, admit of it, if they had the inclination. So ill contrived are thoſe receptacles for Bees.

617. It is of great conſequence to know, or obſerve, when the Bees have done honey gathering; for that muſt be the general time of taking up hives in the common way, as alſo from all thoſe that yet remain doubled,

on the improved plan. For as ſoon as the flowers decay, or ceaſe to yield their luſcious ſweets, the Bees will begin to feed on their hive honey; and particularly thoſe in the doubled ones on that hive which they do not intend to be their winter ſtore. And ſhould there be many Drones left at that time, a great deal of honey will be conſumed in a very few days. No gormandizers at a turtle or veniſon feaſt, can be more voracious than the Drones are at this time.

618. About the beginning of Auguſt is the uſual time of failure, eſpecially if a good deal of rain happens to fall then. But as our ſeaſons vary, ſo will the time for the ceaſing of this buſineſs. The ſummer of the year 1779 being hot and dry, the flowers were exhauſted long before the uſual period; therefore Stocks ſhould have been taken, near a month ſooner than moſt of them were; (the heath countries excepted). This was the reaſon that many Apiators had not near the honey they expected; becauſe they had let their Stocks ſtand until great part was eaten. For the Bees will conſume more honey in the firſt five or ſix weeks after collecting is over, than during the whole winter; unleſs it prove very mild.

In ſome former years I have perceived the Bees begin to eat the honey out of the new combs in my boxes, and out of the glaſſes that were over them, as early as the 25th of July. The country people are greatly deceived in this matter; for ſeeing the Bees continually carrying in a yellow ſubſtance upon their legs, they unjuſtly conclude their ſtore is increaſing, whereas it is quite the reverſe; this ſubſtance being only to feed the young; and as theſe are continually increaſing until October, ſo much the more honey will be conſumed, without the leaſt advantage to the owner. For theſe very young Bees, as well as the old, are all to be ſuffocated together; however late the time of taking may be. A practice as abſurd as it is unprofitable!

619. Through the windows of box hives may be readily ſeen, when the Bees begin to empty the cells of their honey; which will be a profitable advice with regard to all the reſt, if the Apiator be provident enough to attend to it. But it is more particularly important to thoſe that deſtroy their Bees. For the longer the Stocks ſtand in theſe circumſtances the greater will be the diminution of the honey; not only by the old Bees, but alſo by the continual hatching of the young; which continues even ſo late as October. But in the double mode, the detriment is perhaps not great; as all the young Bees are ſaved; whether taken up early or late (588).

620. The following rules and precautions ſhould be obſerved in taking up the Stocks in autumn.

621. Take up all that are more than two years old, for the combs after that time will

become black and foul, by being the receptacle of ſeveral repeated broods. Great part of them are alſo crammed with ſtale and uſeleſs farina, which altogether cauſes a hive to feel heavy, which when taken yields but little honey, of a very bad quality; and ſo ſmall a portion of wax as hardly to anſwer the extraction. Old hives are alſo very ſubject to the moths, which deſtroy many Stocks every year. The Bees of ſuch Stocks may be drove and added to other Stocks; or drove into one of thoſe hives you have taken of the preſent year, that is properly filled with honey.

622. In theſe particulars the double method has alſo a great ſuperiority; for by ſo frequently ſhifting the hives, the combs are never old and black, nor ſtuffed with ſtale farina and other impurities; conſequently yielding more wax and honey, and of a purer quality. For the impurities being interſperſed among ſo great a number of cells, it is next to impoſſible to procure the honey without ſome mixture of ſuch heterogeneous matter.

623. Take up all Stocks that are light, and that are neither full of Bees or honey.

624. The greater the number of Bees in a hive, the larger muſt be the quantity of honey to ſupport them until next ſeaſon; conſequently a hive full of Bees, and but little honey, muſt be *taken*; or both Bees and honey will be loſt.

625. Stocks in autumn that are full combed down to the floors, ſhould be taken: one

ſuch is worth three or four others, nor will they be ſo proper to ſtand; for, being quite full of honey, in the ſpring there will not be vacant cells enough to depoſit the brood in; and therefore though the Stock in ſpring may be rich in ſweets, yet it will be but poor in Bees, and conſequently not likely to ſwarm that ſeaſon; or if it ſhould, the Swarm will be late and inconſiderable. In our double method no ſuch inconvenience can ariſe; becauſe another hive can be furniſhed them in the ſpring as ſoon as they ſeem to want it.

626. When a wet ſummer makes honey ſcarce, keep the beſt Stocks: but after a dry and plentiful one, a moderate Stock will prove beſt for ſtore.

627. No Stocks ſhould be left, unleſs three parts full of honey, as near as you can gueſs. The Bees of thoſe Stocks, which have not quantity, ſhould be incorporated with others that are well provided.

628. To judge of the weight and fullneſs of hives, obſerve the directions (586); this may alſo be ſufficiently well judged of, by poiſing them in your hand; by which method, after a little expererience, you will be enabled to make a proper eſtimate. A memorandum may likewiſe be made of the weight of an empty hive or box, floors and all; by which means the weight of a Swarm or Stock may at any time be known to a great nicety; firſt ſtopping up the door-way to keep the Bees in, and then weighing the hive.

629. Several weak Stocks ſhould be united into one, and placed in a good hive of honey, which will both ſave the Bees, and form an excellent Stock for the next year; for weak Stocks generally periſh in the ſpring. Though I have known inſtances of weak Stocks ſituated near a large common, ſkirted by woods, and with few others Bees in the neighbourhood, that have proſpered; and the enſuing ſpring proving early and favourable, have ſent out large Swarms; however, it is by no means prudent to truſt to ſuch contingencies.

630. It may be taken for a general rule, that the more ſcanty your paſturage, or the poorer your ſituation, ſo much the more populous and richer, ſhould the Stocks be that are left for the next year. Caſts in general are never worth keeping; but ſhould be united at firſt (366): however, if inadvertently any are ſtanding in autumn; they are to be drove out, and incorporated with other Stocks; but as their combs are virgin, and great part empty, they ſhould be carefully preſerved as decoy combs for your glaſſes next year. Theſe ſhould be wrapped up in paper, and depoſited in ſome dark but dry place; otherwiſe the moth will get to them, and eat up the wax. Or ſome of the hives may be preſerved, being cloſely ſtopped up, and taken care of as above-mentioned. Theſe will excellently ſerve for additions to your old Stocks the next year; for the Bees finding ſo much ready-made furniture, will more certainly quit their old habitations.

631. If a bee-keeper reſides in ſuch a ſituation for paſturage, as to admit of keeping a large number of Stocks, and is deſirous of ſo doing, he muſt obſerve to leave ſtanding all thoſe each year, that are *proper* for it, until there be the number wanted.

632. In the double method not only *this* ſhould be attended to, but *alſo*, not to raiſe or double your hives until they ſwarm, or at leaſt not before it be too late for them to ſwarm with ſucceſs; or in caſe of much lying-out. From hence it naturally follows that the profits muſt be very limited, until the deſired increaſe be made; but when that point is once obtained, there will ſoon be ample intereſt for all the trouble and forbearance.

633. If Stocks are left double until autumn, the Bees will gradually aſcend into the upper box or hive, as faſt as they conſume the honey of the lower one, and in proportion as the weather grows cooler. At this time no Bees will guard the door-way, and therefore either the box muſt be taken, or the lower entrance ſtopped up, and the upper one opened; otherwiſe waſps or robbing Bees will invade and ruin the Stock. From the ſame principles the Bees of a common ſtraw hive, that have been ſet over a Stock inverted or turned upſide down, will *deſcend* therein at the approach of cold, provided there be but one Queen in both.

634. Bees greatly decreaſe in autumn and winter. A great many that were bred in the ſpring or in the preceeding autumn, die of age;

others of hard labour, cold, and a variety of accidents; ſo that hives which were very full of Bees in the latter end of ſummer, by November appear very vacant; nor will they ceaſe diminiſhing, till a freſh brood begins to repleniſh the deſerted cells. This ſhould ſeem a convincing demonſtration of the *neceſſity* of ſaving the Stock Bees, when the honey is taken, inſtead of ſuffocating them. For theſe hives contain as many young Bees as thoſe you preſerve; and when both united together, form a very populous Stock for the ſpring; even after the inevitable decreaſe, by a natural old age. Some prejudiced people, however, will always ſhut their eyes againſt the cleareſt light!

635. Weak Stocks may at any time be ſtrengthened by Caſts, or by holding a large mouth'd bottle to the entrance of a very populous Stock, when gently ſtriking the hive numbers will be in a hurry to come out, and ſo be catched therein. As ſoon as you have got a ſufficiency, cover the mouth of the bottle with a paper, having air-holes in it; at night fix the mouth of the bottle to the mouth of the hive you would repleniſh, cloſing up all other openings; the Bees will ſoon quit the bottle to enjoy more comfortable accommodations; or by ſetting ſome honeyed combs upon a hive floor, and an empty hive over them, great multitudes will be attracted to feed: when there is a company adequate to your intention, ſtop the door-way, and thus confine them until night. Take the hive gently

up, for the Bees will be collected at the top, ſet them over or under the Stock you wiſh to ſtrengthen, and the next morning or evening take away the empty hive.

636. It is worthy of remark, that when by age or any accident a Queen dies, the Bees of that hive commonly quit it, and join themſelves to ſome other Stock: but to make themſelves the more acceptable they gradually take the honey from their own hive, and carry it as a preſent to their new aſſociates. That ſuch an accident has happened to a Stock may be known by a clear and uninterrupted humming of the Bees in the hive; by there being a great croud at the entrance (provided it is not ſwarming-time); by their ſeeming melancholy and indolent; by their not carrying any farina; and appearing not to fight or quarrel.

637. Upon any ſuſpicions of this kind you may by attentively obſerving, readily diſcover to which of your Stocks they are carrying the treaſure; for in this caſe the Bees of this Stock will be ſeen in an unuſual hurry, and precipitately going in and out in great crouds. You may either permit them to continue carrying off the honey; or if the queenleſs Stock be your own, poiſe it in your hands, and if you judge there be honey enough left worth taking, at night remove it to an outhouſe, and if there be any Bees in it, drive them out into an empty hive, and ſet it cloſe to the Stock, mouth to mouth, and they will unite with the Stock before morning, otherwiſe you would loſe all the honey.

638. But if the hive be heavy, full of Bees, and perhaps a large brood, and if the Queen has not been long dead, it will be prudent to preſerve it. This may be done if it be at a time, that ſome of your Stocks can ſpare a young Queen, or even a royal cell ſealed up, which being put juſt within the door-way will be received with the greateſt pleaſure, and will immediately encourage them to proceed to their work again. But otherwiſe, ſet the hive over a weak Stock to incorporate with it.

639. All Stocks however do not deſert their hives on this melancholy occaſion; but will continue to work, though very little, and with no ſpirit; and will gradually decreaſe, until at laſt none are left; or perhaps before that period, will become a prey to robbers.

640. If a Queen dies, though ſeveral weeks after a ſwarm is hived, they uſually deſert their hive, and return to the mother Stock, tranſporting their honey with them.

641. As many country people, notwithſtanding all that has been ſaid, or all the arguments that can be uſed, will yet remain obſtinately blind to their own intereſt, and annually deſtroy their Bees; therefore, that we may not be accuſed of a fond partiality, we ſubjoin the pernicious method.

642. Prepare a few rags dipped in melted brimſtone; theſe, at night, are to be ſet on fire, and laid in a hole made in the ground near the bee-ſtand. The Stock is then nimbly to be

taken off and ſet over the ſuffocating fume, which in a very few minutes deſtroys the lives and happineſs of thouſands. A few ſtrokes of the hand, will cauſe thoſe that ſtill hang among the combs to fall; which concludes the dreadful cataſtophe!

Alas! ill-fated Bees! doomed to be victims of your own induſtry!

643. The cruelty of this practice, the poet has adverted to, with ſuch pathetic energy, that I feel myſelf conſtrained to tranſcribe it.

644. "Ah ſee where robb'd and murder'd, in that pit,
Lies the ſtill heaving hive! at evening ſnatched,
Beneath the cloud of guilt-concealing night,
And fix'd o'er ſulphur: while not dreaming ill,
The happy people, in their waxen cells,
Sat tending public cares, and planning ſchemes
Of temperance, for winter poor; rejoiced
To mark, full flowing round, their copious ſtores;
Sudden the dark oppreſſive ſteam aſcends:
And us'd to milder ſcents, the tender race,
By thouſands, tumble from their honey'd domes,
Convolv'd and agonizing in the duſt.
And was it for this you roam'd the ſpring,
Intent from flower to flower? for this you toil'd
Ceaſeleſs the burning ſummer-heat's away?
For this in autumn ſearch'd the blooming waſte,
Nor loſt one ſunny gleam? for this ſad fate?
O man! tyrannic lord! how long, how long,
Shall proſtrate nature groan beneath your rage,

Awaiting renovation? *When oblig'd,*
Muſt you deſtroy? of their ambroſial food
Can you not borrow; and in juſt return,
Afford them ſhelter from the wintry winds;
Or, as the ſharp year pinches, with their own
Again regale them on ſome ſmiling day?
See where the ſtony bottom of their town
Looks deſolate, and wild; with here and there
A helpleſs number, who the ruin'd ſtate
Survive, lamenting weak, caſt out to death.
Thus a proud city, populous and rich,
Full of the works of peace, and high in joy,
At theatre or feaſt, or ſunk in ſleep,
(As late, PALERMO, was thy fate) is ſeiz'd
By ſome dread earthquake, and convulſive hurl'd
Sheer from the black foundation, ſtench involv'd,
Into a gulph of blue ſulphureous flame."

THOMSON'S SEASONS.

645. But to countenance this yearly maſſacre, a very plauſible reaſon will be retorted upon me. That as Bees live but a *year*, to what purpoſe keep an old or laſt year's Stock which will die of themſelves, tho' we do not deſtroy them? A hive of Bees may be compared to a city, whoſe inhabitants conſidered *ſingly* have a limited and ſhort duration, but the City may continue populous, for a thouſand generations. There is a continual ſucceſſion of births, as well as of deaths. So is it with the city of Bees, in which, at the uſual taking-up-time, there are Bees in every ſtage of life; from infancy to mature

old age. And are in this reſpect, upon a par with any Swarm you have. The walls of their city indeed, being made of ſtraw, ſoon decay, and their combs, after two years become black and foul, and detrimental to their future proſperity, But the Bees as a collective body, will perpetuate their ſocieties, like every other claſs of creatures, as long as the world endures.

646. But here it may be aſked, if we are never to deſtroy the Bees, what is to be done with them, when we have as many as our ſituation and paſturage will ſupport? Whenever you become ſo fortunate, augment each Stock, by re-uniting the Swarms again to them (379). By which means your Stocks will afford you a very great increaſe of virgin honey, or of glaſſes of honey of high value.

647. When Stocks are ſo populous as to contain in each of them, as many as three good Swarms, it is as many as will thrive together in one hive; therefore if you have ſtill more Swarms, unite two or three of theſe to form one Stock; and ſhould you have too many Swarms; either ſell *them*, or ſome of your Stocks, or, obtain permiſſion to ſet them in diſtant gardens. For unfavourable ſeaſons will come, accidents may happen, and your home Stocks be diminiſhed and want a reinforcement.

648. Laſtly, there is one way, ſuper-eminent in wiſdom and beneficence; rather than expoſe your ſuperfluous Stocks to a needleſs and barbarous burning, give them to

ſome of your poor, but deſerving neighbours, who live at ſuch a diſtance as not to interfere with the paſturage of your own Stocks. So will the hungry be fed, and your own hearts exult in the pleaſing joy of conferring a benefit on a deſerving family, and ſaving the lives of thouſands of ſuch induſtrious inſects.

CHAPTER XVIII.

Of Waſps, Mice, and other Deſtroyers of BEES, *with the Means of Prevention.*

649. THE Bees, like many other worthy and induſtrious people, are often plundered of their well earned wealth, circumvented in their honeſt labours, and robbed of their peace by the idle, the vicious, and the envious.

Of this wicked fraternity, the Woodpecker or (as ſome call it) the Tree-creeper ſtands foremoſt, ſeizing them without mercy, as they are gathering farina from off the ſallows, in early ſpring.

650. The Sparrow and that voracious and daring bird of ſuperſtition, the Robin Redbreaſt, will peck them off the flowers, or even (as I have often ſeen) ſtand upon their

reſting boards and ſeize them as they iſſue from their hives. Swallows catch the Bees as they fly and carry them to their neſts. Theſe birds ſhould be deſtroyed by the gun, by limed twigs, or by giving a few pence to children to take their neſts.

651. The mouſe is a very formidable enemy in the winter, deſtroying a Stock preſently; to which he is often tempted, by the large and deep gaſhes injudiciouſly made by country people in the edges of their hives, by which he is admitted without obſtruction or difficulty. But where this is not the caſe, he will endeavour either to enlarge the entrance, to make a freſh opening in the ſkirts, or ſome other part, or make a lodgement over the top, under the hackel, and there form his neſt; and by degrees gnaw a way through into the center of the hive, for the more ready ſupport of himſelf and young. Therefore where hackels are uſed (pans are not ſo liable to this inconvenience) the tops and ſkirts ſhould be often examined. The door-ways ſhould alſo be leſſened, by pieces of wood, cut to proper dimenſions, or by plaiſter or clay, thereby rendering the entrance too low for them, as well as ſlugs or ſnails to enter.

652. But if your Apiary be much infeſted by mice, traps ſhould be ſet; or a kitten, reared and fed therein without being ſuffered to come into the houſe, will at the ſame time keep the mice from your Stocks, and the birds from your grounds, and there-

by not only preſerve your Bees but alſo your garden ſeeds. The kitten, however, of any cat indiſcriminately will not do. Cats, as well as men and monkies, have a diverſity of talents, adapted to different purpoſes: therefore chooſe one from a dam famous for birds and field mice, and let the kitten remain with her mother long enough to receive her inſtructions, and to profit from her example. There are few quadrupeds but what give their offspring an education, ſuitable to their ſituation in life: whether all bipeds do ſo too, I pretend not to determine. Beſides, the amorous parley of a congreſs of cats on a ſtarry night will prove highly terrific to this whole ſpecies of vermin.

653. When thoſe ſlow movers, the ſlugs, blunder their way into a hive, it is by miſtake and not by intention; (for their taſte is not ſuited to reliſh ſuch ſweets) and their company is as diſagreeable to the Bees, as that of drunkards, or a debauchee, would be to a ſociety of angels; however as theſe ſimple inſects do no harm, they will in time find their way out again. I have often ſeen them againſt the windows of my boxes, but never found any, either dead or alive, when the boxes have been taken up.

654. Hornets in ſpring, will watch the coming out of the Bees, and deſtroy them. But as theſe fierce inſects are few in number, and ſcarce, unleſs they be neſted near the Apiary, they ſeldom do any great damage.

655. Waſps are extremely dangerous at

the latter end of ſummer, and in autumn. A Waſp is much ſtronger than a Bee; ſo much ſo that one will diſengage himſelf from two or three Bees, and probably with the death of one or two of them. They are very bold, and will frequently get into a hive in ſpite of all obſtacles, and at the greateſt hazard, but are generally either killed or eſcape loaded with the choiceſt honey. But when the weather grows ſo cold that the Bees cannot keep guard, numbers will then get in and devour a great deal of honey, as well as many of the Bees; and ſhould the Stock be weak, will totally deſtroy it.

656. The winter's wet and cold generally kill many of the Mother-Waſps, while in their torpid ſtate. If the ſpring alſo be wet and cold, it hinders their breeding, and cauſes the brood to be few and late. Should the beginning of April be warm, and afterwards cold and ſtormy, it will prevent their coming out for food, and moſt part of them will be ſtarved to death; freeing the Bees from the danger of them that year. Nay a continuance of wet, though without cold, ſo ſpoils their neſts, that few Waſps will be ſeen 'till the middle of September. But a mild winter, when ſucceeded by a hot and dry ſpring and ſummer, will ſo favour their increaſe, almoſt in every place, that, without diligent attention, many Stocks will be ruined by their depredations.

657. The beſt time to prevent a great increaſe of theſe miſchievious inſects is in the

ſpring; by killing the Mother-Waſps, in March or April, when they firſt make their appearance, among old timber and buildings, to collect ſmall ſhivers of the wood to form their neſts with. They alſo viſit the gooſeberry and currant buſhes about that time. By deſtroying *One* then, you in fact cut off a whole brood. For all the common Waſps, or Workers, die in the autumn, leaving only the females, to renew the ſpecies the next year.

658. Phials of ſugar and ale hung about the places of their haunts, will attract their notice, and allure them to their deſtruction. But theſe muſt not be placed among your Bees, for they alſo will then ſip and die; therefore, wherever you ſet the phials, they muſt be well looked after, and if the Bees are obſerved to viſit them, they muſt be removed further off, or ſtopt up, until honey gathering commences: at which time the Bees will be in no danger; at leaſt not till the latter end of the ſummer when as young Waſps beginning then to be very numerous, many perſons very imprudently place phials of ſugar and ale among their bee-ſtands, thereby inticing all the Waſps of the neighbourhood into their Apiaries. This however ſhould be cautiouſly avoided as above directed.

659. Perhaps a piece of liver, or ſweet fruit put into the bottom of a long necked bottle, would be moſt eligible; the Bees, not liking ſuch entertainment, will then be in no danger.

670. It

670. If Waſps are ſeen to attempt any Stock, eſpecially in autumn, contract the door-way by a piece of tea lead or tin, pierced with holes, and faſtened thereto, leaving only about half an inch for the paſſage of the Bees. For a few in number can defend a ſmall paſs againſt a mighty hoſt. But ſhould the Bees ſeem remiſs and not ſufficiently courageous to do their duty, thruſt a ſmall twig ſeveral times into their hive; this will rouze and irritate them, ſo as to make them vent their fury upon the Waſps; and the Apiator too if he does not make a nimble retreat.

671. Waſps neſts ſhould be ſought out, and as many deſtroyed as poſſible. For a trifle boys will do it by way of diverſion. The beſt method of doing it, is to take half an ounce of gunpowder, wet it juſt ſufficiently to make it ſtick together to burn without explosion, ſimilar to what the boys call a wild-fire. Put it into a paper, rolled up like a quill, of about a finger's length: leaving one end open. It muſt be made up but a little while before it be uſed, or it will grow too dry. A little before night, or very early in the morning, when the Waſps are all at home, examine if there be any more paſſages to their neſts than one, and with a clump of earth or ſod, ſtop them all up but one, and have another ſod in readineſs to ſtop up that alſo. Then with a match ſet fire to the end of the ſquib, thruſt it directly into the hole or mouth of the neſt, and immediately ſtop it up with the ſod as cloſe as poſſible,

that none of the fume may eſcape. In a few minutes the Waſps will be all ſuffocated, but will recover again in a ſhort time if expoſed to the air; therefore for the greater certainty, the neſt ſhould be dug up with all expedition, and either burnt or buried. The neſt may be dug up whole, as a natural curioſity worthy of notice. Some neſts may be very extenſive, and will therefore require double the quantity of gunpowder. If two ounces be uſed, and all the paſſages well cloſed up, they will be ſo effectually ſuffocated as to riſe no more. The young brood of the neſts, will furniſh an excellent entertainment for poultry, or for fiſh, if thrown into the ponds. The tops of their neſts are often within half a foot of the ſurface, but ſometimes not within a foot or foot and a half.

672. Or a hole may be made juſt over the top of their neſts, and a large quantity of water poured therein ſufficient to drown them: Boiling water will quickly and effectually deſtroy them, either in the ground, or among thatch, or in hollow trees. In ſituations where the other methods cannot ſo conveniently be purſued, ſmoke and the fumes of brimſtone may be introduced, in order to diſlodge or ſmother them.

673. Hornets hang their neſts to the eves, rafters, beams of barns, out-houſes, or in hollow trees. They are of a globular form, the external part of which, like that of the waſp's neſts, is compoſed of the fibres of wood, and much reſembles courſe greyiſh paper. As they are

more formidable and dangerous than Waſps, o their numbers are proportionably ſmaller. The beſt way to effect their deſtruction is to take a bag large enough to ſlip over their neſt, the mouth of which ſhould have a running ſtring, whereby it may eaſily be drawn cloſe together.

674. On a rainy day or night, gently draw the bag over the neſt ſo as to take the whole in, and immediately draw the ſtrings tight, ſo that the neſt and hornets altogether be faſt included in the bag, which ſhould be directly immerſed in water, and remain an hour or more; after which it may ſafely be taken out, the neſt pulled to pieces, and the hornets bruſhed off and buried; but the cakes that have brood in them, as well as thoſe of Waſps, if given to your poultry, will prove a delicious feaſt.

675. The next enemy to our induſtrious Bees, is a large moth called the Wax-Moth, as the maggots proceeding from it devour the wax for their ſuſtenance. The mother of theſe inſects, is extremely attentive to diſcover every crevice, chaſm, or hole about a hive, eſpecially about the ſkirts, as a proper neſts for her eggs. Should ſhe not prove ſucceſsful about the externals of the hive, ſhe will watch an opportunity of ſlipping within, and of doing it there. The eggs ſoon become a large, white, and voracious maggot, which ſpins over itſelf a defence, and annoys the Bees. The maggots continually increaſe and conſume the combs, until at length they poſ-

ſeſs the principal part of the hive, and the poor Bees periſh with famine, or are obliged to ſeparate and ſeek new habitations. Old ſtraw hives are very ſubject to the depredations of theſe inſects, having ſuch inviting harbour for them. Boxes are not ſo ſubject to be infeſted with them as hives, eſpecially if the crevices and joinings be carefully ſtopped up with any kind of cement: but neither boxes nor hives in the double method are liable to ſuffer much from theſe deſtroyers; for being ſo often ſhifted, they have not length of time, even if they get in, to prove very formidable. Which is another proof of the advantages of our changing open method.

676. However it is very proper, as a great preſervative from vermin, that all hives and boxes in the ſpring and autumn be now and then lifted up, the edges rubbed and the floors cleanſed; or, if the floors be moveable, exchanged for freſh dry ones. The beſt time to do it is early in the morning; when the Bees are chilled and drowſy, it may be done ſo nimbly as to be finiſhed before they have recovered themſelves enough to moleſt you. This is particularly needful in the ſpring, as ſoon as the Bees ſeem briſk: as during the winter there will be a collection of crumbs of wax, dead Bees, that perhaps have died of age, and other filth; which, if not removed, will annoy the Bees and hinder their work.

677. Wood-lice are alſo great deſtroyers of Bees. Bee-ſtands, cots or houſes, that are

made of old decayed wood, harbour and encourage their breed. Old timber or old hedges, near the hives have the ſame bad tendency. During the cold of the winter and ſpring they will breed in the combs and conſume the honey. They ſhould be often ſought for and killed.

678. Earwigs are nightly plunderers; they can enter by a very narrow chaſm; and conceal themſelves in a very ſmall ſpace. They ſteal in at night, drag out Bee after Bee, ſucking out their vitals, and leave nothing but their ſkins, as ſo many ſcalps, emblems of their butchery; thus gradually diminiſhing the Stock, while the Apiator is oftentimes ignorantly wondering at the cauſe. When the ſhells of Bees are perceived about a Stock, it ſhews the pernicious buſineſs is begun. Search for the neſts of the ear-wigs, and kill them. Cloſe every crevice that may have given them admittance: the edges of the hives and floors, and every part of the ſtands or houſe muſt be bruſhed and made very clean. Let no ſtraw, rags, or cloth remain about the hives, for theſe inſects preſently conceal themſelves and ſettle therein: and continue to ſearch for them every day, ſo long as any mangled Bees are found about the hive.

679. The hives and houſes ſhould likewiſe be often bruſhed, and kept particularly free from ſpiders webs. This requires to be done almoſt every day during the ſummer; or many of the Bees will be intangled in theſe fatal nets, and become victims to theſe ſolitary devourers.

680. Snails and Slugs ſhould often be ſearched for, and taken away; and nothing left about the hives to conceal them.

681. Cleanlineſs is an article of conſequence in the preſervation of Bees, as may be ſeen by the many enemies with which they are encompaſſed. Their increaſe and proſperity therefore, may rationally be expected to be in proportion to the care taken of them.

Riches ſeldom flow into the lap of indolence; but the hand of induſtry ſhall be rewarded with plenty.

CHAPTER XIX.

Of their WARS *and* ROBBERIES, *and Directions how to terminate or prevent them.*

682. AMAZING! can ſuch epithets be applicable to the induſtrious Bees? Yes, it cannot be concealed, that in ſome particulars, they but too much reſemble the *rational ſpecies*. But which are moſt to blame? Let the philoſopher and the divine determine. I am only a champion for the Bees, and hope to exculpate them.

In their own habitations, and among their own communities, as well as when at their labours, Bees are as pacific as a monk in his cell: but if pinched with hunger, at a time when no proviſion is to be got by *honeſt induſtry*, they become deſperate and furious: " Hunger, (according to the old proverb) " will break through ſtone walls:" The Bees, thus ſituated, will turn robbers rather than die. But among the rulers of mankind can this neceſſity be pleaded for the deluge of blood ſo frequently ſpilt? Alas! no!

683. Bees are never poor through want of provident care, or through indolence, on their own part; but frequently from a long continuance of inclement weather, or from ſwarming too *late*, or through an inſufficiency of numbers. When by ſome or all of theſe cauſes, they have been prevented from repleniſhing their hives in time, they conſult upon furniſhing themſelves in an expeditious manner, by beſieging and plundering the caſtles of ſome of the neighbourhood.

684. Being determined upon the point, ſcouts are ſent out to obtain intelligence, and others as ſpies, who if poſſible are to get in undiſcovered, and to make the proper obſervations of the force, ſtrength, and treaſure of the Stock to be attacked. At firſt the ſpies are very timorous, trying to pitch here and there, and ſometimes ſettling at the doorway to make obſervations, and then are upon the wing again. The invaded Bees at the ſame inſtant, if they are ſtrong in force, will

endeavour to ſeize and diſpatch them for their inſolence; from which time a ſtrong guard will always be kept at the entrance.

685. But if a few have been ſo ſucceſsful as to get admittance, and taſte the ſweets with impunity, the next day they will form a regular attack in full force. In conſequence of which, a moſt fatal ſcene of war and ſlaughter will enſue. All is fury and tumult: kill or be killed is the dreadful alternative. Thouſands on both ſides preſently lie dead or dying; nor does night put an end to the conflict. Day after day, the bloody conteſt is renewed, both within the hive and without. For the invaders will never give out if they have once penetrated ſo far as to open the ſealed combs. In this caſe nothing but fury, deſolation and death is to be ſeen throughout the whole domain. One only circumſtance excepted; which is, the death of the Queen of the invaded Stock. This the enemy knows, and therefore to make ſhort work, the boldeſt of them endeavour to ruſh upon her as ſoon as poſſible; in this attempt great numbers fall victims to their raſhneſs; but whenever any of them reach her, ſhe is inſtantly ſlain. A truce is now immediately ſounded by both armies, and hoſtilities ſuddenly ceaſe, an alliance is made, and the vanquiſhed Bees aſſiſt in tranſporting their own treaſure to the caſtle of their invaders.

686. Sometimes however, the Queen, and a few of her ſubjects, eſcape; leaving her city and treaſure in the poſſeſſion of the con-

querors. Sad reverſe of fortune! bereaved of every thing! what expedient can ſave them? famine or fighting is the deplored alternative. The laſt, as the leſſer evil, is preferred. They become in their turn, a ſet of lawleſs rovers. Seeking therefore another Bee-garden, they endeavour to retaliate their cruel treatment on ſome of theſe: and in the attempt will ſurely die or conquer.

687. Will the ſenate decree a civic crown, to him who ſhall point out the method of terminating theſe ruinous wars and ſaving a Queen.

688. Crown or no crown, we will try our ſkill. Whenever ſtrange Bees are ſeen, trying to ſlide into a hive, the door-way muſt be contracted to half an inch, as a narrow paſſage can be eaſily defended by a few againſt a great number. This is beſt done by ſlips of tin or tea-lead perforated with holes; and having a paſſage cut out at the bottom of half an inch in length, and faſtened to the hive by a nail at each end: or, by a piece of elder ſlit and the pith taken out; two of theſe are to be placed in the door-way, the reſt plaiſtered up with clay or cow dung. Then thruſt a twig into the hive, to rouſe the anger of the Bees, to make them keep guard. But if notwithſtanding this, the next day more ſtrangers appear, ſtop the hive quite up, leaving only ſome air-holes.

689. By theſe means, both the true and falſe Bees will be kept out 'till evening, when

thoſe of all the other Stocks are gone to reſt: at which times the falſe Bees that are without will return home; then unſtopping the hive, if any falſe be within, they will alſo iſſue out and depart, and your own Bees that were kept waiting without will enter.

690. Feel the weight of your hive, and if in good condition and ſufficiently ſtocked with Bees, you may venture to let it ſtand a ſiege the next day, provided the door-way of it be ſtopped very early the next morning, ſome time before any Bees are yet abroad. In conſequence of this, the enemy Bees, as faſt as they come and are attempting to enter, may be knocked down with a piece of thin board, or the like, and killed, by a perſon appointed on purpoſe: this is to be continued without intermiſſion, ſo long as any of them appear. In about four, five, or ſix hours, according to the number, the whole will be deſtroyed. After waiting an hour longer, and no more are perceived to come, your own Bees may be let out. This confinement will make your own Bees furious againſt any future aſſault.

691. But ſhould a Stock be aſſaulted, and the fight begun before you are apprized of it, immediately ſtop the door-way up; and at night, if you find it poor and weak, unite it to ſome other Stock (380), taking care to preſerve the brood (588); for being ſo much weakened, it will hardly turn to any account in ſtanding, or will moſt likely fall a prey to ſome other invaders.

When a Stock is beſet day after day, it is a ſign that the robbers have taſted deep of the nectar; in this caſe it will be beſt to take it, if light, and to drive the Bees and unite them to another hive. But if weighty, let it ſtand, and kill the robbers. If they are not killed all in one day, two or three days may be taken, keeping the Bees ſtopped up all the while. But it will be beſt to finiſh them if poſſible in one day, leſt in revenge for their diſappointment they ſhould fall upon ſome of your other Stocks. A good method to prevent it, is to irritate all your other Stocks by thruſting a twig into each of their hives.

692. When a Stock has been aſſaulted, but preſently becomes quiet, and great crouds are obſerved going in and out, it denotes the death of the Queen. If this Stock be not immediately ſtopped up, all the honey will be carried away. In the evening unſtop it, and about an hour afterwards, the Bees will have all quitted it, and what honey they have left will be at your ſervice.

693. An attack by robbers may be eaſily known by the number of dead Bees on the ground before the hive, as alſo by the crumbs of wax about the entrance of the hive, and by the Bees therein being in an uproar and confuſion. Theſe battles of the Bees are more or leſs violent in proportion to the number of Bees invading or invaded, if the Stock be weak, and the robbers numerous, victory ſoon follows the firſt aſſault.

694. If a Stock happen to be without a Queen, it makes but a feeble reſiſtance, or oftener none at all, which is alſo the caſe when late in the ſeaſon, and the weather cold: For this occaſions the bottom of the hive to be left vacant and without a guard at ſuch times an half inch door-way will be fully ſufficient.

695. As ſoon as robbers begin to ſhew their evil deſigns in a Bee-garden, the Bees of all your good Stocks will conſtantly keep guard at the door-ways. Theſe are known to be *ſuch*, by the unuſual number of Bees *there*, at that ſeaſon of the year; and by their being withdrawn as the intruders diſappear. One year my Bees were obliged thus to defend their ports for near three weeks; now and then having ſlight ſkirmiſhes with the enemy; ſometimes one Stock and ſometimes another: but the robbers finding them all too well provided, and their reception rather too warm, retreated to a neighbour's Apiary, where they ſucceeded to the ruin of two weak Stocks.

696. Theſe invaders, I afterwards underderſtood, were a large Swarm of another neighbour's that did not riſe until the latter end of July; and the remainder of the ſeaſon proving very unfavourable, ſtern famine drove them to theſe daring extremities.

697. It is ſingular that Bees ſeldom or ever rob any Stocks of their own Apiary; unleſs there happen to be no weaker Stocks in the neighbourhood. Strong Stocks are very ſel-

dom attacked; which is one reaſon, among many others, for keeping none but what are ſo.

698. The robbing-time is ſooner or later, according as the ſpring or ſummer is more or leſs favourable; but it is generally twice a year, ſpring and fall. In the ſpring it is not much, compared to that in the fall of the leaf. If in the ſpring the weather prove warm, the Bees are thereby invited out; but, unable to procure honey from the flowers, and their own ſtock being exhauſted, they are induced to become invaders of others property. The ſpring robbing is over the beginning of April, ſometimes early in March, according as the flowers are more or leſs fit for furniſhing ſubſiſtence.

699. But the moſt dangerous time is the latter end of July, and moſt part of Auguſt; nay, I have known ſome ſo late as the 3d of September. The Bees are moſt deſperate in autumn, knowing they can then have no other reſource. As ſoon as ever honey-gathering fails, robbing begins. Every day great attention muſt be paid to your Stocks, that the invaſion may be ſeen before much damage is done.

700. When Swarms have been plentiful, but late, and the weather indifferent, it will be a dangerous autumn; and will require a very watchful eye to be kept over the Apiary. Whenever one Stock is beſet, put your others in a proper poſture of defence, by contracting the entrances: this may prevent their being

put to the trial. A ſmall force will defend a narrow paſs againſt the power of a great army. However, diſcretion muſt be uſed in narrowing the door-ways, which muſt be done only in proportion to the number of Bees at work, that they may not be too much crowded in their paſſing in and out.

701. When a hive of any force begins to be aſſaulted, the Bees become very irritable and quarrelſome; they will then ſting the Apiator, though familiar with, and fond of him at other times.

702. A weak Stock that is in danger, had better be united to another weak Stock (if you have ſuch a one) that has honey enough for both: by this means they will form a competent Stock to withſtand the enemy, to reſiſt the ſeverity of the winter's cold, and the ſcantineſs of an auſtere ſpring.

CHAP.

CHAPTER XX.

On the great Mortality of BEES *in Winter and Spring; the cauſe inveſtigated, and how to prevent it: alſo the manner of feeding them to the beſt advantage.*

703. THE articles of this chapter are of great importance, as ſome hundred Stocks are loſt every year, through ignorance or inattention to theſe points. Nor as yet, hath the practice been reduced to any degree of certainty, or well adapted to public uſe; writers having differed greatly upon a ſubject which, in appearance, ſeems of no difficulty. However it is hoped, the experiments I have tried will enable me to remove all the difficulties.

704. It muſt be conſidered, that Bees are capable of reſiſting cold only to a certain degree. That which reduces them to a lethargic, or torpid ſtate, is ſalutary; for thereby becoming motionleſs, perſpiration, and circulation of the fluids, are ſtopped, and the conſequent diſſipation prevented; in this ſtate any freſh ſupply of ſuſtenance is unneceſſary. But the warm air of the ſpring, diſſolving their coagulated fluids, reſtores them again to activity and to the impulſe of hunger.

705. But ſhould they be expoſed to ſuch a degree of cold, as to coagulate their fluids

beyond

beyond the influence of heat to reſtore, they are in a hopeleſs ſtate, and cannot be revivified.

706. But here occurs the grand difficulty; viz. that of knowing what degree of cold will keep Bees in the beneficial torpid ſtate, without injuring them. It muſt be allowed that this is far from being a fixed point, and not eaſily to be aſcertained. But though it is not prudent to walk too near a precipice, eſpecially with a giddy head, yet we may ſafely approach it at ſome yards diſtance. We hope, therefore, to ſhew in the ſequel, that any common capacity, may readily avoid each dangerous extreme, without being either a philoſopher or a conjurer. Nor is there any neceſſity for a thermometer* to regulate to a nicety this part of ruſtic œconomy.

707. Though a Bee, ſingle and at *reſt*, be not able to reſiſt a degree of cold much milder than that which congeals water, and will die in a temperament mild enough for moſt other inſects of our climate; yet by *motion* it can acquire ſuch a heat as will enable it to reſiſt an air that has made me quake on going into it from a warm room.

708. It is well known that exerciſe will preſerve the human body in a genial comfortable glow of warmth, though in an air ſo cold as otherwiſe would prove nearly fatal. The Bees experience a ſimilar influence from motion.

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* *Natural Hiſtory of Bees*, p. 408.

709. When they are collected into a compact body, as is their uſual manner in their hives, though then motionleſs, they retain, by their numbers, a very conſiderable heat, and which increaſes many degrees ſoon after, and in proportion to any motion commenced. To elucidate my meaning, let me compare a hive to a barn, on entering which ſingly, in a cold winter's day, our bodies will be chilled, and we ſhall feel ourſelves very uncomfortable; but ſhould it be ſoon filled with people we ſhould preſently become not only warm but even hot.

710. Though from the difference of ſituations, diſpoſitions of places, and qualities of hives, we cannot form one certain rule, yet this we may ſafely infer, that the greater quantity of Bees there is in a hive, the leſs danger they will be in of ſuffering by cold. For which reaſon, while a populous Stock will remain healthy, a poor one ſhall be periſhing. One hive ſhall be thrown into a uſeful lethargy by the ſame cold weather, which would ſcarcely diminiſh the heat of another. And whilſt the Bees in one hive, ſhall be conſuming their proviſions, thoſe in another ſhall be expiring with cold.

711. From hence appears the neceſſity of a moderately ſized hive (viz. half a buſhel) for their winter reſidence, for if too ſmall they will, in our *common* winters, be too crouded and too warm: or if the hive be over large, they will not be numerous enough to keep up the ſalutary ſtandard of health

ſufficient to counteract a cold, damp, and noxious air. Many have been the inventions of ingenious gentlemen to preſerve Bees in this healthy medium. It may be uſeful to give a few remarks upon thoſe of moſt note.

712. And firſt of placing Stocks in ice-houſes. The impracticability of this method with reſpect to general uſe needs ſcarcely to be pointed out to any one; it is ſufficiently obvious at the very firſt view. None but the opulent poſſeſs any; and it is by no means probable, that any nobleman or gentleman in the kingdom will permit the farmers and cottagers to depoſit their Bee Stocks in their ice-houſes. The benefit ariſing from it alſo, would not repay the trouble, even upon the ſuppoſition of a more certain preſervation; which yet is very doubtful: for unleſs the Bees of each Stock were very numerous, the icy coldneſs would certainly congeal their fluids beyond the limits of a future diſſolubility.

713. The next method, and which ſeems more feaſible*, is that of ſurrounding the hives every way, with dry earth or ſand, between hurdles, or in caſks, with a little trunk to extend beyond the earth as a paſſage for the Bees: a pan of honey, properly covered being firſt placed underneath the hives.

714. To this it may be objected, that a good Stock by this treatment will be kept

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* *Natural Hiſtory of Bees.*

too warm; ſo much ſo indeed, that unleſs the winter prove very ſevere, the Bees will not be in a torpid ſtate during any part of it, and conſequently conſume a large quantity of honey: which had they ſtood expoſed to the weather, would have been ſaved. On the contrary, ſhould the winter be attended with a cold, damp, and foggy air, both the good and the bad Stocks will be in danger from the abſorbing power of the earth, which ſucks in like a ſponge ſuch noxious damps, and thus the hives will be filled with putrid exhalations, together with the confined and putrid perſpiration of the Bees themſelves. This may be ſeen, though in a much leſs degree, on the inſide of the windows of box hives in ſuch weather. Under ſuch circumſtances how is it poſſible for the Bees to be otherwiſe than weak and ſickly? And indeed this will be found to be the caſe; the poor inſects are afflicted with the flux, and being too weak to go abroad to empty themſelves they ſoil each other as they hang, and alſo the floor; by theſe means the vicious quality of the confined air being increaſed, the whole community at length becomes infected; and the Bees periſh by the very means that were intended for their preſervation: ſome of the more vigorous lighting upon the floor, become immediately ſo chilled, and ſo beſmeared with the clammy excrement that, not being able to riſe, they preſently expire. Upon the whole, this appears too hazardous for public uſe, to ſay nothing of the trouble and expence.

715. But further, ſuppoſing they are hereby kept ſo *warm* and dry as to obviate theſe inconveniences, will they not ſuffer equally by over feeding? And will they not alſo conſume more ſupplied honey, during the winter and ſpring, than the profits ariſing from them will counter-balance, ſhould they proſper?

716. Another method has been propoſed of ſhutting Stocks up in a dark, cold out-houſe, from the middle of September to the middle of April,* as an improvement upon Reameaur's method of incloſing them in caſks (713).

717. This no doubt is much more practicable: but from many experiments I tried this way, I perceived not the leaſt ſuperior advantage; and more frequently the contrary. To which I will add that the keeping them entirely ſhut up, and inactive for ſeven months, is by no means what is wanted: Three months, at moſt will ſuffice for their indolence. But to take four months more of their breeding time, when they generally are anxious to repair their winter loſs, by raiſing a young and ſturdy brood againſt the harveſt of honey, ſeems a very prepoſterous ſcheme of management. The author was certainly too precipitate in publiſhing a method founded upon a ſingle experiment, and that not in his favour; for he allows, that if his mode ſhould be eligible, the degree of care neceſſary in conducting it,

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* *Article* 15*th*, *of De Re Ruſtica.*

can ſcarcely be expected from ſervants and gardeners, who have many other things to attend to; and I add much leſs can it be expected from farmers and cottagers; beſides, this gentleman did not conſider, that the Queen often begins to breed the beginning of February, (if the Bees have liberty to fetch in farina); and during this month, and the ſucceeding one of March, there is generally a prodigious increaſe of young. It is commonly believed that a Bee is twenty days in hatching, and that the maggots are fed with freſh farina, without which they periſh. Therefore if the Bees be confined until the middle of April, it will be twenty days before a ſingle Bee is bred, which brings it to the 5th of May, and conſequently there muſt be a loſs of more than three months brood, that is to ſay, of a complete Swarm: for many Swarms riſe in April, and even at the beginning of it, in favourable ſeaſons. Whereas by the ſhutting-up method, the Swarms muſt be very late, and frequently there will be none at all. Nor can the three months loſs of time be ever regained, ſo as to render ſuch a Stock equal to one that has got ſo many thouſands of young vigorous Bees ready to collect the honey as ſoon as it appears; while they themſelves are chiefly employed in rearing brood; and have but few labourers to ſpare for other work.

718. Beſides, however ſuch Stocks may be confined, yet whenever the air is warm, it will pervade their hives, and rouſe the Bees

to action. They will then, by their diſcontented notes, ſhew how impatient they are of the conſtraint; and how eager to taſte the ſweets of the freſh air, to empty themſelves abroad, and to renew their labours at the time appointed by nature herſelf.

719. From what has been now offered, the inference ſeems to be, that bad conſequences muſt ariſe from ſhutting up Bees indiſcriminately. Perhaps, however, in extraordinary froſty weather, or deep ſnows, it may be of ſervice to ſtop up the door-ways of hives, as they ſtand; leaving only a ſmall air-hole, and taking care that they be all opened again as ſoon as the froſt breaks.

720. Having tried a great number of experiments to aſcertain the beſt method of preſervation, it appears to me that a good Stock, viz. one well filled with honey and numerous in Bees, in a ſound hive, and covered with a pan, hackel, or the like, will ſtand our uſual winters, without any detriment, and be more healthy, than by any other treatment. But when the froſt is uncommonly ſevere, a ſack, bag, or pea-halm, thrown over them, during its continuance, is all the additional attention neceſſary.

721. The recital of ſome obſervations will illuſtrate this more diſtinctly. In the hard froſt, and deep ſnow, of January 1776, the barometer was between twenty-nine and thirty degrees; and the thermometer from fifteen to twenty-eight; ſome days it was at the loweſt numbers; and the weather was more in-

tenſely cold than in 1740. During this froſt two of my box Stocks, having no additional covering, periſhed. Two weak Stocks, in ſtraw hives on ſtands, ſuffered the ſame fate; theſe had no covering except a plumb baſket. All my other Stocks being rich, ſurvived the ſeverity of the winter and flouriſhed abundantly.

722. It is worth notice, that one of the boxes that failed, had, notwithſtanding, plenty of Bees and of ſealed honey; and, what is ſtill more extraordinary, the honey was liquid and tranſparent, at the termination of the froſt, when I took it. Upon examination I found that the top of this box had warped, and thereby let in too much cold air.

723. In confirmation that ſevere froſt will not injure Bees, we appeal to Siberia and Ruſſia; where the winters are many degrees colder than any we have; where the hives are formed of the bark of trees, which are not ſo warm as our ſtraw hives; and alſo, where Bees inhabit hollow trees, as with us; and yet, notwithſtanding all theſe ſeeming impediments, are known to thrive; but whether, equally with ours, hive for hive, remains to be yet aſcertained.

724. Froſt is undoubtedly beneficial to the Bees as well as to the owner, while only ſo ſevere as to keep them motionleſs during the winter; for in this caſe moſt part of their honey will be ſaved; as they will not be capable of feeding, 'till near the return of the flowery ſweets furniſhing a freſh ſupply. Early

Swarms are likewiſe cauſed by this ſituation. But the inſtability of our climate, and the frequent and often ſudden tranſitions from one extreme to another, prove more fatal to the delicate conſtitutions of the Bees than a ſeries of any one kind of weather whatever. Valetudinarians among us too frequently ſuffer from the ſame cauſe.

725. In contraſt to the foregoing obſervation; the ſpring of the ſucceeding year viz. 1777, was too cold for the Bees to collect any farina; I did not obſerve them to carry any in until the 16th of March, and then but little, and thus it continued until the latter end of April. This prevented the uſual increaſe of brood. Nor indeed was the ſummer more propitious for the collection of honey. In the beginning of May ſeveral weak Stocks died, and the weather permitted little or no forraging till the 26th of May, 'till which time my Bees all partook of a general feeding, or common table (760). Moſt part of June was cold, the 21ſt of which a weak Stock died. So that I was obliged to renew the feeding, and continue it until July: the laſt day of which was ſo cold, wet, and windy, as to require fires being made in the parlours. And yet, on that day, a neighbour's Swarm roſe. The whole ſummer proved ſo unfavourable that none of my Stocks got a fourth part of what would be neceſſary for their winter ſtore. To complete the miſfortune, the enſuing autumn and winter were alſo very unkindly, being replete with

damp foggy air: this, as all the Stocks were very poor, and ſcanty of numbers, affected the weakeſt very ſeverely, cauſing a fatal purging, which deſtroyed many of them before I could find a remedy. The following ſucceeded to my wiſhes, and is the more valuable, as it is within the reach of the meaneſt cottager.

726. Incorporate two or three weak Stocks into one (409, 629), joining them to that which has the moſt honey. This operation ſhould be performed in a warm room, if the ſeaſon be very cold.

727. The ſtock-hive is then to be ſet upon a very clean and dry floor, on which coal-aſhes (or, where theſe cannot be procured, wood-aſhes will perhaps do) are to be laid about an inch thick, and over theſe clean dry ſtraw. This management keeps the hive ſufficiently dry and warm at the bottom, and when the Bees happen to dung, it paſſes among the ſtraw, ſo as not to ſoil or chill them when they fall down, or alight. At the ſame time the hives muſt be well covered with ſacks, cloths, pea-haulms, or the like, ſo as to keep the whole hive moderately warm: but a ſmall opening is to be left for their paſſing out, whenever the mildneſs of the air or their occaſions invite them. As the ſtraw will keep the edges of the hives hollow from the floor, where pans are not uſed to cover them, in lieu thereof bricks or large ſtones muſt be laid on the tops, ſufficient to keep the hives cloſe down to the floors.

728. By this ſimple and eaſy management I preſerved all the reſt of my Stocks, and they requited me by their future proſperous labour. Flannels or woollen cloths laid on the floors of the hives, were found of no ſervice. The ſtraw and the aſhes ſeem the beſt antidote to the pernicious effects of cold foggy air, which I take to be the only *one* that is dangerous to Bees; preſerve them from this and keep your hives full, and the froſt will bite in vain.

729. Boxes are not near ſo warm as ſtraw-hives, therefore in hard weather they ſhould have a bag or ſtraw laid over them. But a medium muſt be obſerved, not to keep them ſo warm, as to be in motion.

730. There is no ſort of danger in permitting the Bees to ſally out as they like. They are the beſt judges of the degree of cold they can bear. The only danger is when the ground is covered with ſnow, and at the ſame time a ſmiling ſun invites them out to taſte its benign influence; but no ſooner are the unfortunate Bees out, than they behold the face of nature intirely changed, they are confuſed and confounded, they fall, and are immediately chilled to death by the ſnow. The remedy is to ſhade the door-ways from the rays of the ſun, during this weather; or ſtop them up, leaving only air-holes until the ſnow is entirely gone.

731. When Bees have fallen to the bottom of the hive, and ſeem motionleſs or dead, it is a ſign the Stock wants more warmth: in this caſe,

caſe it will periſh, unleſs immediately removed into a warm-room, and placed near the fire until the Bees begin to revive, then ſtop up the door-way. ſo that none can come out, and at night put them on a prepared floor (726) and cover them up warm.

732. Mr. Wildman directs that to preſerve the Bees in one of his boxes, which has windows in three of the ſides, the glaſs is to be taken out in October, and pieces of blotting-paper, or ſoft flannel, placed in lieu thereof, This appears to me a troubleſome and needleſs buſineſs; for my boxes, with like panes of glaſs, ſtood in my Bee-houſe (which is not very cloſe) during a froſt that was ſevere enough to freeze water in the houſe, and yet received no harm: though nothing was done but covering the box with a bag: neither is it neceſſary to have any ſlips of wood placed againſt the glaſs to prevent the Bees from fixing their combs thereto. The glaſs will bear the preſſure of the combs without ſuch aſſiſtance: which will alſo prevent that perfect inſpection for which the windows were chiefly intended. Perhaps Mr. Wildman truſted to theory, and did not try a box without thoſe precautions. Hence it is that the world is peſtered with theoretic deductions, unſupported by practical demonſtrations.

733. It is very uncertain whether a weak Stock can be preſerved by all the pains, expence, and care you can beſtow; for it is an hundred to one, but that it will be labour loſt; ſuppoſing it ſucceeds, the produce of ſuch a feeble

a feeble Stock the next ſummer, either as to ſwarming or honey, will not be equal to the expence and attendance; nor adequate to what they would have furniſhed, if they had been united to a good Stock. It muſt be folly to prefer a hazardous chance to an apparent certainty; for which reaſon it has been directed (627) to keep no weak Stocks, but to incorporate them in the autumn.

734. Bees in weak Stocks may not unaptly be compared to a young trader, who from the ill-judged pride or parſimony of a parent is placed with a ſmall capital, in a buſineſs that required a large one; but the means being diſproportionate to the end, a bankruptcy is inevitable; notwithſtanding the moſt aſſiduous and conſtant exertion of ſkill, induſtry, temperance, and frugality.

735. We come now to the article of *Feeding*; which in ſome inſtances is abſolutely neceſſary; for it may ſometimes happen that a ſummer (ſuch as was that of 1777) ſhall prove ſo very unfavourable as to furniſh little or no honey; conſequently *no* Stock can have a ſufficiency for the winter.

736. This is a trying caſe, for being both weak and poor, they demand our utmoſt care they will require to be kept warm, and to be conſtantly, though moderately fed. Where there are ſeveral poor Stocks, this will be very troubleſome, and uncertain in the event; for if the feeding happens to be neglected but two or three days, it is moſt likely that they will all periſh, (752).

737. But by uniting ſeveral of theſe together (even at that ſeaſon) this attendance is greatly leſſened; and the Bees being alſo ſufficiently numerous to keep up a comfortable warmth, they can deſcend without danger, to partake of the daily bounty beſtowed upon them, and thereby eſcape thoſe two formidable enemies, cold and hunger.

738. The mode and matter with which they are to be fed, require a careful diſcuſſion, as errors in theſe have done much miſchief. Bees have been fed, with one or more of the following articles, according as whim, ſuperſtition, or fancy has directed; ſalt, bean-flour, ſweet-wort, treacle, beer-grounds, dead birds, toaſt and honey, fruit, ſugar, honey, and farina, with many others that I ſuppoſe have not come to my knowledge. Out of this farrago I ſhall only remark upon honey, farina, and ſugar; the reſt I conſider either as uſeleſs or pernicious.

739. Several late authors have ſuppoſed honey the only and beſt food for Bees. This Monſieur Reaumur diſputes, from the inſtances of Stocks dying, tho' ſurrounded with combs of honey; from whence he draws the concluſion, that honey alone is too lax a diet unleſs aſſiſted by farina, which he characterizes as the *true bee-bread.* I apprehend the objections are as great againſt the farina as the honey; for if farina be abſolutely *neceſſary,* how is it that more Bees die in ſpring, when plenty of freſh farina may be procured, than at any other ſeaſon of the year? Many of

my Stocks have often failed, although they had a ſufficiency both of *honey* and *farina*.

740. Beſides, I have often ſupplied poor Stocks with double the quantity of honey to what any of my other Stocks had in their hives, and yet they periſhed in the ſpring.*

741. As honey ſerved rather to increaſe the malady than cure it, I next tried ſugar, both of different ſorts, and mixed with water and with ale, boiled and unboiled: but all was found ineffectual, though the Bees at the ſame time were properly ſecured from cold. I then concluded the error muſt ariſe from too great a profuſion in the ſupply of the food; taking the hint from

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* *Perhaps the following experiment, as being new, may not be unpleaſing to the reader. To ſupply the* poor *Bees (as I then thought) in the beſt manner, I hung combs of honey to the bars of an empty hive by bits of very narrow tape: at firſt I was anxious leſt they ſhould gnaw the tapes aſunder, before they had repaired and fixed the combs; and thereby let them tumble down to the bottom and cruſh many to death: however, they agreeably deceived me; for they firſt faſtened the combs in their uſual manner, and then gnawed the tapes aſunder, and drew them out of their hives, ten* or *twelve of them at a tape, like ſailors pulling at a rope. This experiment I repeated ſeveral times, with always the ſame reſult. Here it might be aſked, how came the Bees by this ſagacity? muſt they not have reaſoned upon the caſe, and that ſuch a ſingular one as neither they nor their predeceſſors had ever ſeen before. Was it inſtinct? or was it not rather the effect of* thought? *How infinitely diverſified may this* thinking ſomething be! *from the loweſt degree of animation to that of a Newton; and from a Newton, by imperceptible gradations, to that of angels and archangels, even to infinite incomprehenſibility! But this is a point of too much ſublimity for mortals to reach.*

the experiments in which the Bees died, though furniſhed with combs enough to ſupport two populous Stocks.

742. An experiment of Reaumur's, ſeems to fix this point beyond diſpute. "Some "Bees were placed in a hive without "leaving them any honey-combs, or even "the liberty of ſeeking their food abroad. "To compenſate for this they were ſupplied with pure honey. At firſt they were "fed *ſparingly*, which kept them alive a"bove three weeks: however, I was after"wards too bounteous; they eating *ſo much*, "that they ſoon had *purgings*; they wetted "one another; and ſome days after, they all "died; and were as wet on this occaſion as "as if they had been dipped in water thick"ened with honey."

743. From theſe inſtances, we may conclude Bees are like ſome creatures of a more noble ſpecies, who, not contented with a temperate enjoyment of abundance, feed to exceſs, and thereby lay a ſure foundation for numberleſs diſeaſes, often terminating in an untimely and painful death.

744. Thus the Bees, allured by a ſudden and too large ſupply at once, and obtained without either labour or pains, gorge themſelves ſo as to bring on a fatal laxity; the very diſeaſe your care and kindneſs intended to prevent. It is probable, however, that the purging does not always ariſe ſolely from exceſs, but ſometimes from a previous weakneſs, attended with a retention of the perſpirable matter,

occaſioned by a damp cold air. The Bees, incapable of diſengaging themſelves from each other, are under the neceſſity of emptying themſelves as they hang cluſtered together, thereby ſoiling thoſe beneath; the whole cluſter at length becomes infected; the floor is bedewed with the excrement, which beſmears thoſe that fall on it; and at the ſame time the air of the hive is rendered more noxious; which haſtens the deſtruction of the whole.

745. For the cure, Reaumur directs a comb of crude honey (by which he means farina) to be given to the ſick Bees; but this I have found by experience to be of no real benefit. Ruſden recommends ſalt and honey; but ſo far from liking a compoſition of this ſort, they will be diſpleaſed with the offer. It has been aſſerted, that Bees will eat ſalt, and that they thrive beſt near the ſea. It may be ſo, but not becauſe they ſuck the ſalt water; it is not uncommon to aſcribe effects to wrong cauſes. I have often tried them with ſalt, and with ſalt-water; but inſtead of pleaſing, it manifeſtly offended them. The only effectual method of cure is to take away the cauſe; to keep none but populous hives; and, if there be occaſion, to feed them, though but ſparingly.

746. Whenever a number of Bees are ſeen dead at the bottom of the hive, it is a ſign that their ſituation is either too cold, too damp, or that they are famiſhing (772). Tho' ſometimes Bees may be found upon the floor, that have died merely of old age; for

as they enter the ſtage of life at different periods of the ſpring and ſummer, they will depart from it alſo in all the various ſeaſons of the year. Nor hath the brighteſt genius, by the deepeſt reſearches, yet diſcovered a ſpecific to change the decrepitude of age into the blooming vigour of youth and beauty. It is divine temperance alone that is able to procure a happy longevity, though it cannot communicate immortality.

747. Bees may be fed either with honey or ſugar. The laſt anſwers full as well, if not better, than honey. I generally feed with ſugar, as being much cheaper here than honey. But in ſome counties it may often happen, that honey is not ſo valuable as ſugar, conſequently the former is to be preferred.

748. Honey, after it has been ſome time taken out of the combs, becomes grainy and hard; and is then not digeſtible by the Bees, unleſs reduced to the ſame liquid ſtate as when taken from the hives. This may be done by putting a quarter of a pint of *mild* ale to a pound and an half of honey, and mixing it well together; this will be of a ſimilar conſiſtence with hive honey, and will not grow ſeedy again. Warder directs water, (perhaps the Doctor was a water drinker) but I know by frequent trial, that ale is more agreeable to the Bees; not that they will be tipſey with it, but it acts on them as a cordial, gives them more vigour, they thrive upon it, and look plump and ſhining.

749. If ſugar be uſed, it ſhould be of the coarſeſt and dampeſt kind; that which feels ſandy or grainy is improper, and for the ſame reaſon as grainy honey. For as the Bees receive their food by licking it with their tongues, as dogs lap, and not by ſucking or grinding, therefore when ſuch ſugar is given them, the hard grains are left until a moiſt air diſſolves them. The ſugar muſt therefore be damped with a little ale, not boiled, nor with ſo much as to make it run. Sometimes, however, in the early part of the ſpring, the Bees of a Stock are weak and ſickly; they then require more of the cordial quality of the ale, and cannot feed on the ſugar unleſs made as liquid as the honey; (I ſpeak from experience) but as the ſpring advances they grow ſtronger, and require it to be thicker.

750. The ſediment of treacle caſks, or the grounds of beer, will give the Bees a looſeneſs, ſo will ſweet-wort, if given in great quantities and often; but a little, when you brew, will be an acceptable change.

751. That *ale and ſugar* will preſerve Bees, ſeems evident from an experiment made in May, 1773. The greater part of that month had been wet and cold, after a long ſeaſon of moderate froſt and ſunny days. At that time there was plenty of borage, apple, and other bloſſoms; yet two of my Stocks, that were full of Bees, were near periſhing of famine; ſome hundreds lay on the ground before the hive, living, but too much chilled to riſe, They were taken up, and carried to a proper

diſtance from the fire, where they preſently revived. I then fed them with ſugar and ale, and returned them to the Stocks, which were conſtantly fed with the ſame, though but ſparingly, until honey-gathering commenced; and they afterwards amply recompenced me for my aſſiſtance.

752. I have at other times treated Stocks in the ſame manner. But what aſcertains the propriety of this meaſure, beyond a poſſibility of doubt is, that having only neglected to feed them three or four days they have periſhed. Doubtleſs, this is attended with ſome trouble; ſo is feeding poultry and pigs: let the farmer's wife refrain from it three or four days, and ſee how fat they will be.

753. The manner of furniſhing the food becomes our next conſideration. Warder condemns the country dames for what he thinks a very deſtructive manner of feeding. But I have tried both his method and theirs, and found my Bees died when fed as he directs, while the good women preſerved theirs by their uſual means.

754. But to be more particular: the ſetting plates of honey under hives is attended with many inconveniences. Lifting the hive up, in order to ſet the plate under, and afterwards to take it away, greatly irritates the Bees; and each time the Apiator will be ſtung, as alſo ſome of the Bees cruſhed under the plate, and under the edge of the hives. Alſo as the combs in general extend down to, and are faſtened to the floor, there is con-

ſequently no room for the plate to ſtand under without damaging the combs, or preventing the hive from ſetting cloſe to the floor. Beſides which, the method of laying a paper with holes in it over the plate of honey, is certainly an improper one, as the paper will be apt to ſlip aſide, or wrinkle up, ſo that the Bees will get under, and numbers of them be ſmothered in the honey. Old combs ſet under, is a preferable method to the above, but is not free from ſome of theſe objections.

755. Mr. Wildman contrived a circular little box, with a mouth to it, to enter a little way into the door-way of the hive. I diſlike it, as being too expenſive; as ſtanding expoſed to the cold out of the hive; as the honey is to be covered with paper, which makes it liable to the foregoing objections: and laſtly, as the Bees are obliged to leave the warm hive to feed in the box.

756. I have tried perforated tin tubes, let into the top of the hives, and into the ſides; tin trunks, and a variety of other contrivances, but find none equal to the ſimple, eaſy, and cheap method of kexes: theſe are troughs made of the joints of any plant that is pithy or hollow; thoſe of elder are the beſt of all for this purpoſe. Select thoſe joints that are longeſt, and not more than one year's growth; take the rind or bark off, as alſo the upper part, 'till the joint is ſhallow enough to ſlide in at the door-ways of the hives, leaving about two inches at one end uncut, as a handle, and at the other end a little of the pith, to prevent

the ſugar or honey from ſliding out into the hive. Make the under part a little flat, that it may reſt ſteady, and not be liable to turn aſide, which it will be apt to do if left in its natural roundneſs, and thereby the hive floor will be ſoiled with the ſugar, to the detriment of the Bees.

757. As theſe little troughs are but narrow, the Bees will ſtand on the edges, and feed out of them, equally as ſafe as at their combs; and as their length is ſix, ſeven, or eight inches, their food is introduced into the warm part of the hive. By theſe means they are not too much chilled by any degree of coldneſs in the air that makes it neceſſary for them to feed. For in a very cold ſtate of the atmoſphere they are torpid, and take no food at all (704).

758. One of theſe troughs, or kexes, full, is enough, in general, to ſupply any Stock twenty-four hours. They ſhould be placed in the hive every evening, and changed the next. Such Stocks as do not nearly conſume the quantity, ſhould have leſs given them at a time, that there may be no danger of their overcharging themſelves (741).

759. This method of feeding is only neceſſary when the weather is not mild enough for the Bees to come out of their hives to feed; or when you want to ſupply only a particular hive or hives; or, if feeding become neceſſary before the Waſps are gone. But be ſure never to place the food at the entrance of the hive; for, if there be any poor Stocks in the neighbourhood,

bourhood, they will be allured to partake of it with your own Bees, and thus occaſion the death of many every day by their quarrels. This may be called *Separate Feeding.*

760. But to ſhorten the trouble, when the weather is ſufficiently mild, either in autumn or ſpring, as occaſion may be, and the Bees ſeem active, all the Stocks may be fed at once; which is called *Public Feeding.* This is beſt done by procuring a piece of ſome compact wood, as aſh, oak, &c. about eight inches long, four wide, and an inch thick at leaſt; let this be made full of circular holes by an auger, or rather a center bit, each hole to be half an inch in diameter, and a quarter of an inch diſtant from each other, and as deep as the wood will admit, but ſo as to hold water. If there be any inconvenience in getting the holes made, the board may have grooves cut out, of half an inch in width, leaving wood enough at each end to ſtop the ſugar from running out; or, if cut quite through it muſt be ſtopped with putty.

761. Theſe inſtruments, (which I ſhall call feeders, eſpecially the firſt kind of them, as in ſome degree, reſembling honey-combs) the Bees will cordially feed out of without danger of beſmearing themſelves, which they generally do when platters or plates are ſet, however well regulated; and without occaſioning any dangerous quarrels among them; for though they will not ſtab each other, yet they will ſometimes box and bite, and tumble one another about among their food, ſo as to

deſtroy many lives, when they cannot get readily at it. The ſugar or honey may be made thinner for theſe public feedings than for the private, ſo thin indeed as to pour thro' a tea-pot, which will be the moſt convenient inſtrument to fill the holes with.

762. Theſe feeders ſhould be ſet upon a ſtand of ſome ſort, about the middle of the Apiary, and placed under an old hive, pan, or the like, leaving an ample vacancy for their entrance at the bottom; for if not protected from the wet, a ſudden ſhower may prove deſtructive to many hundred Bees. One of theſe feeders, filled, is ſufficient for twelve Stocks for a day's ſupply.

763. There is no preciſely determining the quantity of honey or ſugar neceſſary to ſupport a Stock through the winter and ſpring. The numbers are ſo different in different Stocks, and the weather ſo various, that one year may require double that of another. Sixteen pounds of ſugar and one quart of ale ſuſtained twelve of my poor Stocks through the autumn and until the ſucceeding May; at which time they deſerted the ſugar, and began to provide for themſelves.

764. By this method of feeding the whole expence of feeding twelve poor Stocks thro' a very dreary ſeaſon, amounted only to five ſhillings and eight-pence, whereas ſix, eight, or ten pounds of honey have been given to ſingle Stocks, upon another plan, and yet ſuch Stocks periſhed.

765. In the ſpring all Stocks ſhould be examined, by poiſing them between your hands, whether they be light or no. This ſhould be done as ſoon as they begin to breed, for afterwards, the additional weight of the brood and farina, will induce you to think they are rich in honey, when at the ſame time, they may have little or none in their hives, and may periſh for mere want, *ſeemingly* in the midſt of plenty. But by examining them early, you will be certain to diſtinguiſh ſuch as will want your help, 'till honey paſture comes in, from thoſe that do not.

766. If any of your neighbours keep Bees, their Stocks will partake of the public treat, equally with your own. In ſuch a caſe, and when your Stocks are poor, and *muſt* be fed, the ſeparate feeding is to be preferred, except when the air is too cold for any ſtrange Bees to come ſo far from home. You may eaſily ſee, by the flight of the Bees, whether any come from the ſurrounding quarters.

767. Public feeding will be extremely dangerous to your Apiary, if uſed before the time of robbing be over, as it will intice the robbers to aſſault ſome of your Stocks.

768. There is no danger of your own Bees coming out to feed in too cold weather; mine have publicly fed in December without damage; though in other years May and June have proved ſo unfavourable, that none would venture out, though at ſhort allowance, and greatly preſſed with hunger; but I have known that when they have been out, and fed

ſed for two or three hours, yet upon feeling the air too chilly, they have returned, though in the middle of the day, and the ſun ſhining out.

769. Where a good price is made of honey, feeding in autumn and ſpring will always be advantageous, although your Stocks be well furniſhed; for the more ſugar and ale they conſume, ſo much the greater will be the ſaving of the Stock honey; they will ſwarm the ſooner, and the ſooner fill an additional hive: or ſhould the inclement ſeaſon continue longer than uſual, your Stocks will be in ſecurity and plenty while thoſe of your neighbours are ſtarving. Here then is a management doubly advantageous.

770. The continuance of feeding, muſt however be regulated by the commencement of honey gathering; for although the Bees will in general neglect the ſugar as ſoon as their favourite flowers appear, yet they will not always, but ſometimes carry in both honey and ſugar, and thereby debaſe the quality of the comb honey. As ſoon therefore as they ſeem to *ſlight* the ſugar, the feeding muſt be diſcontinued.

771. Whenever it is obſerved in the ſpring that the Bees of any hives do not fly out as others do, ſuch may be concluded to be famiſhing, or on the point of dying: turn up the hive, and if they do not ſtir, remove them to the houſe fire; as ſoon as they begin to crawl give them a kex of liquid food, and ſtop the paſſage ſo that none may come

out; at night ſet them in their place again, cover them warm, and continue to feed them every day, as long as neceſſary: but, if on turning them up they appear lively, and have honey, but have ceaſed from working, it is a ſign they have loſt their Queen, and therefore muſt be united to ſome other Stock (376), or you will have neither honey nor Bees left.

772. The Queen's death is often occaſioned by age, diſeaſe, or ſome accident. If at this time the Stock be numerous and rich, the Bees will deſert the hive, and take their treaſure with them (636): but if *they* ſhould not, other Bees or vermin will, unleſs the Apiator be ſharp-ſighted enough to prevent them.

773. When Bees fly in an idle manner about their hive in the ſpring, when thoſe of the other Stocks do not, it is ſign of poverty, and they will require ſuccour 'till the honey ſeaſon commences (765, 752). At any time if you ſee the wax crumbled on the hive floors, or about the door-way, it is a token the Bees are in ſome diſtreſs; turn the hive up, if very light, and without honey, but the floor dry, and the Bees lively, it denotes famine; the Bees however may be ſaved by proper feeding or uniting.

774. When Bees are motionleſs, merely through hunger, heat will not reſtore them; but, when the hive is turned up, if ſome ſugar or a ſmall quantity of liquid honey be dropped among them it will recover great part of them.

775. Whenever many of your Bees are obſerved to fly about the door, with a lamenting tone, in ſpring or autumn, it is to acquaint the Apiator that they are in diſtreſs, and want his charitable aſſiſtance: by inſpecting the Stocks, and by the unuſual number at ſome of the door-ways, you may know which Stock wants ſuccour: this muſt be immediate, for the next day may be too late.

776. As ſoon as there is plenty of farina in early ſpring, and mild weather to favour the collection of it, the Bees will breed apace. Having thus a continual increaſe of many mouths, if there be not plenty of honey in ſtore, or if the ſeaſon continue for a length of time propitious for breeding, but unfavourable for honey-gathering, the Stocks, eſpecially the poor ones, will be more in danger than at any other time: hence it is that ſuch numbers of Stocks periſh in May. The prevention is a cautious and timely feeding. Hunger, which increaſes the fierceneſs of many ferocious creatures, has a contrary effect on the Bees, cauſing them to be very tame, ſo that a hive may then be turned up without their offering to ſting.

777. The way to avoid having poor Stocks is to be ſo moderate in their number, that they ſtarve not each other, through the want of paſture to ſupply them all (566). By theſe means, though leſs in ſhew, you will have more in ſubſtance, and be always a ſucceſsful and proſperous Apiator; without being or fearing either a witch or a conjuror.

778. If Stocks at any time be removed from one part of an Apiary to another, the ſtand or door-way from whence they are taken, muſt be diſguiſed by a mat, cloth, or the like, or the Bees will waſte much time, and many be loſt, by returning to the ſame ſtand again.

779. The ſlits or openings that are made to admit the ſliders in the tops of the hives and box, ſhould always be ſtopped up by ſmall wedges of wood or of tea lead, to keep out the moth and other inſects; unleſs in hot weather, when they may be open to let in the air, to keep the hives from being too hot.

CHAPTER XXI.

How to Extract the HONEY *and* WAX *from the* COMBS; *with ſeveral new Methods of doing it.*

780. THE combs ſhould be taken out of the hives as ſoon as poſſible, and the honey drained from them while yet warm, as it will then run more freely. To further this intention, the hives ſhould be brought into a warm room, if the air be cool,

but where no Bees can enter: for otherwiſe the ſmell of the honey will attract multitudes to their deſtruction; and likewiſe greatly interrupt the operation.

781. In my open top hives and boxes, that have but one ſpleet, a notch muſt be cut in the edges of the combs, that the ſpleet may be taken out without damaging any other part of the combs; for which purpoſe one end of the ſpleet muſt be cut through, cloſe to the ſide of the hive, and it may then be eaſily drawn out. The combs are then to be looſened from the ſides of the hive, by being cut through at their edges by a long thin knife; then lifting up the body of the hive, all the combs will be left ſtanding upon the barred top; from which they may be ſeparated by a knife, ſo as to come away whole. This advantage alone in my hives will more than compenſate for the extra expence.

782. If there be any Bees upon the combs, when taken out, they ſhould be bruſhed, or rather blown off, and if beſmeared with honey, waſhed in two or three waters made a little warm; being then laid on a ſieve, and placed in the ſun-ſhine, or before a fire, they will revive again, and fly to their reſpective homes.

783. Thoſe parts of the combs that are empty ſhould be cut off firſt, and thoſe that are black and droſſy, laid by themſelves; as muſt alſo thoſe that have farina; but if any have brood, great care ſhould be taken not to cruſh them, as they muſt be put into an

empty hive (588), and placed over any Stock that moſt wants ſtrengthening.

784. Then thoſe parts of the combs that contain virgin honey (830) are to be cut out, and drained by themſelves; for there are ſcarcely any hives but what have ſome portion of virgin combs in them.

785. Great care muſt be taken that no maggots, or the juice of them, or any of the farina be ſqueezed out among the honey, for both communicate a bad flavour and quality to it; therefore a little honey had better be loſt; or thoſe parts which cannot be ſeparated without foulneſs, be returned again for the Bees to feed on; by which in the end no loſs will be ſuſtained.

786. It is uſual to lay the combs on ſieves for the honey to drain through; but the honey is too long in paſſing through them, and thereby the moſt volatile and fragrant parts are exhaled.

787. A better apparatus is a frame of wires adapted to the ſize of your pans, each wire about one inch diſtant from another; through theſe the honey will ſeparate much ſooner. Lay the combs thereon, cut through the cells about the middle and turn them; in three or four hours the honey will be run out; then cutting through the upper parts as they lay, turn them alſo downward, and the whole will be ſoon finiſhed. Large *tin* dripping-pans are to be preferred for this purpoſe, as iron pans have generally ſome ruſt on them, and earthenware

ware abſorbs or ſucks in a great deal of the honey, which *tin* does not.

788. As ſeveral ſmall portions of the combs will fall between the wires along with the the honey, a bag muſt be provided of a conical form, that is, wide at top, and tapering to a point at bottom; it is to be made of fine flannel, or ſuch canvas or cloth as the dairy people ſtrain their milk through. This is to be hung between two chairs, or to the ceiling, and a jar, or other proper veſſel ſet underneath to receive the honey as it runs through. The honey is to be poured out of the draining pans into theſe bags, whereby it will be entirely freed from every particle of wax, much more ſo than if paſſed through hair ſieves in the common way. Care muſt be taken that the bags be not hung ſo near the fire as to melt the wax, for that will ſpoil both; but a moderate degree of heat will greatly forward the operation; and the honey will be the better the leſs time it is expoſed to the duſt and the air.

789. In large Apiaries, where perhaps fifty or a hundred Stocks are taken up at once, the preſs is by ſome uſed, without any previous drainings; which in the common way, would be a very tedious proceſs, for ſuch quantities. With ſubmiſſion, however, I ſhould imagine, that if a number of large tin pans, with ſticks only laid acroſs them, were uſed, the ſuperior goodneſs of the honey would amply repay the firſt coſt of the pans; and the proceſs would be accompliſhed in a very

moderate time. By the preſs all the honey is made alike impure; which gives too much room for the odious character of ſophiſtication, though perhaps the accuſation of a want of neatneſs might be more applicable. If equal delicacy were obſerved in the extraction of honey as in the management of the diary, it would fully pay for the trouble; and perhaps introduce honey once more to general acceptance.

790. The firſt running from virgin combs only ſhould be reſerved by itſelf, as being of the firſt quality; provided cuſtomers can be found to give a proportionable price. The next in value is that which drains from the other combs indiſcriminately: and a third ſort is produced from the combs when ſqueezed or preſſed through the bags. This ſort will be foul, and fit only for cattle, or ſome external uſe.

800. But where mead is made, it will hardly be worth while to preſs the combs; as they may be thrown into water for that purpoſe directly; or the combs, after preſſing, may be placed, a few at a time, in the Apiary, in *dry* pans, and the Bees will take care that not a particle of the honey ſhall be loſt. If a quantity of the combs be given them at once, they will ſuffocate each other among them. For the ſame reaſon the draining pans muſt be ſtrewed over with ſtraw, or herbs, &c. before they are given to them; otherwiſe, in their eagerneſs they will beſmear themſelves all over. Theſe pans, &c. ſhould be ſet un-

der ſome ſhelter, leſt a ſudden ſhower waſh the honey away and drown the Bees. If they are ſet out in a rainy day, it will prevent the neighbouring Bees from partaking with your own.

801. The pots or veſſels of honey ſhould remain a few days to ſettle before they are cloſely covered for ſale; for if they contain any ſmall particles of wax, theſe will riſe to the top, and are to be ſkimmed off. The good combs are to be kept apart from the bad; as they are intended to be melted ſeparately (807).

802. The uſual method of ſeparating the wax from the droſſy part of the combs is to *boil* them in a proportionable large quantity of water; which is to be frequently ſtirred to prevent the wax from burning: when it has boiled ſufficiently to have thoroughly melted the combs, it is to be put into *hair* bags, ſuch as bottoms of ſieves are made of, and then preſſed by ſome convenient inſtrument ſo long as any wax paſſes thro': the droſſy part that remains may be re-boiled in freſh water, and re-preſſed, whereby more wax will be obtained.

A veſſel of cold water is to be ſo placed as to receive the wax as it comes from the preſs or bag, to cool the wax the ſooner, and to prevent its ſticking. The wax is then to be melted a ſecond time, and preſſed through bags made of cream cloths; after which it is to be melted a third time, and paſſed through bags made of ſtill finer cloth. Laſtly, it is to be melted again, without any water, and poured into pans wider at top than at bottom, ſo that the wax when cold, may be turned out without difficulty: and not only ſo, but the ſmaller the bottom of the cake is, the droſs will be more collected, and conſequently the leſs waſte made in ſcraping it off. This tedious method might be greatly ſhortened by firſt boiling the combs in water, with each quart of which half an ounce of aqua-fortis has been previouſly mixed. After being boiled, the wax will be within two or three inches of the top, intermixed with farina; but a conſiderable quantity of droſs will be at the bottom. If the whole of this maſs be ſuffered to ſtand until quite cold, the droſs at the bottom may be cut off; and the remainder being ſo much more free from impurities, the wax will be far more eaſily extricated.

803. When the wax is in the mould, if there be any froth, blow it to one ſide and ſkim it off. The moulds or veſſels it is poured into ſhould be firſt wetted with cold water, to prevent the cakes ſticking to them. The moulds are to be kept in a warm room until cold, otherwiſe the cakes of wax will crack in the middle. If they happen to ſtick in turning out, warming the veſſels a little will looſen them ſo as to come out with eaſe.

It ſhould be obſerved, that the combs ought not to be ſqueezed when put into the water; as they will melt the ſooner, and the farina, and other impurities be more readily ſeparated.

I would propoſe a bag made of flannel of a moderate thickneſs, as far preferable for ſtraining the wax through than either linen or canvas. It ſhould be hung during the proceſs as near the fire as poſſible without burning. A hoop ſhould be faſtened at the top of the bag to keep it properly extended, ſo as to receive the wax with the greater facility. Before the wax is put into the bag, it ſhould be well and briſkly boiled, and that for ſome time; otherwiſe the wax will not be ſufficiently diſengaged from the droſs, farina, and ſkins of the maggots; with the two laſt it is ſo intimately united, as to be very difficult to ſeparate. A veſſel of *cold* water is to be placed under the bag, to receive the wax as it drops. The firſt running will be good, but as the flannel thickens, by the wax adhering to it, it will come through ſtill more pure; and though from foul combs, will be equal to any of the wax from the virgin combs.

804. When the pores of the bag become ſo choaked with wax as to prevent its paſſing through, return the remaining groſs matter into the boiling water again, and as much as can be ſcraped off the bag inſide and out. To ſhorten the proceſs it will be proper to have a kettle of water boiling by the ſide of the other to recruit its waſte, and to boil the bag in, to clear it of the ſtill adhering wax and droſs; which will otherwiſe prevent any more wax paſſing through it; and this muſt be repeated as often as it becomes clogged. In the ſame manner ſieves or bags of any other materials muſt be treated.

805. The ſeparated wax muſt have all the water ſqueezed from it before it is melted to be put into the moulds: for the water will make the wax liable to crumble.

806. Some ſtrain their wax through hair ſieves; but theſe are ſoon clogged up, and then but little wax will paſs, conſequently there will be a diminution of the profit. Where Apiaries are very large, a preſs is generally uſed to ſeparate the wax; and in ſome places it is done between hot irons.

807. A greater quantity of wax will be procured if the virgin and other yellow combs that have no farina or brood in them, be melted by themſelves: for the fewer impurities there be, the ſooner the wax will run from it; whereas if entangled with a large quantity of droſs, the preſs having leſs power over it, the more difficult and tedious the ſeparation will be. Upon the whole, whichever of theſe methods be taken, it is a very troubleſome buſineſs, conſumes much firing, a quantity of wax is waſted in the operation, and the droſſy matter, which is thrown away, contains a conſiderable portion of wax.

808. Many and great were my endeavours to obviate theſe difficulties, which have puzzled me ever ſince I kept Bees; at laſt I hit upon the following *proceſſes*; which I give to the public as the moſt perfect that have hitherto come to my knowledge. But it will be neceſſary, by way of introduction, to make ſome diſcriminating obſervations on *combs*. If we carefully ſeparate the hard dark coloured or

black cells from each other, either full or empty, they will uniformly be found to conſiſt of a film or very fine ſkin, inſtead of a *partition of wax.* For *Supreme Wiſdom* has indued the Bees with ſuch œconomic ſagacity, that as ſoon as a maggot has quitted its ſkin, they cement or hang it up againſt the waxen ſides of the cell; and very likely ſeveral of them ſucceſſively, until they become ſufficiently ſtrong to form a partition of themſelves; the wax is then *taken away* and applied either to form new or to cover other cells: for the Bees in many inſtances are found to be extremely ſaving of their wax.

809. But in order the more certainly to aſcertain this opinion, I boiled ſome of theſe combs, which were entirely empty, but not the leaſt trace of any wax was found. The experiment was repeated with the ſame kind of combs filled with farina, and the reſult was exactly ſimilar. To corroborate this fact ſtill more, if ſeveral of theſe ſkins or films be twiſted together, and lighted, they will burn like a candle, as many other ſubſtances of this kind will do, though not containing the leaſt particle of wax; whereas, if we preſs together ſeveral of the fineſt virgin cells, and hold them to a candle, they will melt but not flame. To which we may add, that theſe ſkin partitions do not manifeſt any waxen property, either to the eye or the touch: much leſs has farina any ſuch quality when tried by fire. From hence it may be concluded, that we may as well attempt to extract wax

from a paſteboard, as from ſuch kind of combs. Therefore, that ſo very large a quantity of droſſy matter may not prevent a more perfect purification of real waxen combs, they ſhould be previouſly ſeparated by the hand, and thrown on the fire, to make the pot boil, as the beſt uſe they can be put to; which will much ſhorten both the trouble, time, and the expence of fuel uſually beſtowed upon this uſeleſs rubbiſh. People therefore need no longer wonder that the combs from old ſtock hives yield little or no wax; for if any be obtained, it is what covered the honey cells. This alſo ſhews the great advantage of a frequent change of hives for the acquiſition of double or treble the quantity of wax, than can be procured by the old way.

Proceſs the Firſt.

For extracting Marketable WAX *without Preſſing.*

810. Take a tin cullender, all the holes of which are *round*; the handles muſt alſo be off, inſtead of which fix acroſs it a ſtrong wire or iron bail, or a tin one like thoſe of watering-pots; and if ſoldered on the inſide, it will be moſt convenient. The cullender in ſize muſt be adapted to that of the pot or kettle you intend to uſe; but to go within ſide of it, as cloſe to the ſides as poſſible. Set the pot on the fire, with about three or four inches depth of water therein, in which is to be mixed ſingle *aqua-fortis*, in the proportion of half an ounce for each quart of water. In

this put as many wax combs as will conveniently boil when melted. As ſoon as they begin to melt, they ſhould be frequently ſtirred until all be thoroughly melted; let it then boil without ſtirring, that the wax may riſe clear. It ſhould be made to boil very briſkly, during the whole proceſs. As ſoon as the yellow froth riſes, put in the cullender or ſieve, and preſs it down in the liquor, until it be about half full; but great care muſt be taken that none of the liquor riſe over the edge of the cullender, as that will foul what is therein, and ſpoil the operation. With a wooden, or what is better, a tin ladle, firſt dipped in cold water, lightly ſkim off the wax as it riſes upon the ſurface, and put it into a narrow bottomed pan (previouſly rinſed in cold water) ſet as near as can be to the pot on the fire, and continue ſkimming the wax off as long as any riſes, depreſſing the cullender in proportion as the liquor ſinks.

811. Inſtead of a cullender a hair ſieve may be ſubſtituted; but where a perſon keeps ſix or eight Stocks of Bees, it will be moſt profitable and convenient to have a tin veſſel made on purpoſe to fit a due proportioned kettle or pot, the ſides of which ſhould be quite ſtraight, ſo that when the *tin ſeparater* ſlides down, there may be no vacancy for the farina to riſe up between. The holes in this tin ſeparater ſhould be as numerous and ſmall as poſſible in the bottom, and about two inches up the ſides; the bottom ſhould be quite flat,

without a rim, like that of a quart tin pot, that it may preſs the dregs the cloſer down, when near the bottom.

812. When the liquor in the pan is nearly cold, the wax is to be taken out, and what droſs adheres to it ſcraped off. The wax is then to be re-boiled in a ſmall quantity of water, and about a fourth part as much aqua-fortis as before to a quart; as ſoon as it boils take it off, and let it ſtand until cold. The wax will concrete at top, and the remaining droſs being again ſcraped off, may be further purified with other combs.

813. This proceſs will not only extract the wax more completely than any of the methods generally uſed, but it is alſo much leſs troubleſome, and in every other reſpect more eligible; for the aqua-fortis may be got for a penny an ounce, conſequently that trifling charge is much over-balanced by the other ſuperior advantages. As aqua-fortis procured from different places may not always be of equal ſtrength, a conſequent variation will be found in the proceſs. The operator muſt therefore add or ſubſtract in conformity. Some practice is neceſſary to form a judgment, or to conduct this or any other operation ſkilfully. Double aqua-fortis will not anſwer the purpoſe, either in this or any of the following proceſſes, nearly ſo well as the ſingle, and the wax produced will be of a pale dingy colour.

814. A leſs expenſive method, though not ſo eligible, is to put the combs looſely into a can-

a canvas, or rather a fine hair bag, tied up cloſe at the end, and put into a kettle with a due proportion of aqua-fortis and water; a leaden or iron weight is to be laid on the bag to keep it down to the bottom. It muſt be made to boil ſo as to throw up the froth briſkly, which is to be taken off as (810): a thick board with a handle in the middle is then to be put in, to preſs out what wax may be ſtill adhering. It is afterwards to be treated as (812). It ſhould be carefully obſerved that in theſe proceſſes of ſkimming off the froth, what riſes of a clear yellow ſhould be reſerved by itſelf, as often requiring no further purification. The more forcible the froth is thrown up, the purer it will be; and the operation the ſooner finiſhed: by this bag-method, full as much wax, if not more, may be obtained, as by any of the uſual modes.

Proceſs the Second.

815. *To extract Marketable* WAX *from the* COMBS *by a ſingle Operation, without either ſtraining or preſſing.*

816. Take an earthen veſſel, much narrower at the bottom than at the top; put therein a quart of water, and one ounce of ſingle *aqua-fortis*, or the like proportion for larger or leſſer quantities: ſtir them well together, and then put in ſo many good wax

combs as, when melted, will reach within a a finger's length of the top of the pan; ſet it on a clear but ſtrong fire, and as ſoon as it begins to melt, ſtir it about, and ſo continue until it boils, and even longer, if the combs be not all thoroughly melted; remove it then from the fire, and let it ſtand until it be cold.

817. The wax will be in a cake at the top, and the impurities underneath it: there will be two ſorts of impurities; the loweſt will be almoſt entirely droſs; this is to be taken off by itſelf, and is of no value; the next will be a layer of droſs, but with ſome wax intermixed; this alſo is to be taken off, (ſo as to leave the cake pure and reſerved by itſelf; as alſo any foulneſs that may be on the top; both which may be refined along with more combs the next boiling.

818. Old combs that have wax in them, or other refuſe that has been preſſed, but yet retain a conſiderable portion of wax, may be thus treated, and will yield as fine yellow wax as the beſt combs; provided the combs or refuſe have been previouſly preſſed down, and kept in a cloſe tub or veſſel in a houſe for five or ſix weeks: which will occaſion the *impurities* to ferment and rot, (the *wax* will *not*) and thereby diſengage the parts, and diſpoſe them more aptly for ſeparation.

Proceſs the Third.

To extract WAX *from the* COMBS *by a ſingle operation, in a greater degree of purity, and without ſtraining, preſſing, or the uſe of a menſtruum.*

820. Take the ſame kind of veſſel as is uſed in Proceſs the ſecond, put into it about a quarter of a pint of water, to keep the wax from burning; then put in ſo many entire *empty* virgin combs, or at leaſt ſuch as are of a good yellow, as the veſſel will conveniently hold; ſet the pan over a briſk but clear fire; as ſoon as the combs begin to melt, keep it *ſtirring* until it boils; then *ceaſe*, and a clear yellow froth will riſe on the ſide or middle. This is to be ſkilfully taken off as faſt as it riſes, and put into a pan previouſly ſet cloſe by. The fire muſt be ſo managed as to keep the froth riſing up, but not ſo fierce as to make it boil over. If it riſe too faſt, remove the pan to a leſs hot part, or damp the fire a little. The combs, when firſt melted, ſhould only be ſufficient to riſe within three inches of the top of the pan, to prevent the neceſſary riſing froth from running over; when the froth riſes a little foul, return it out of the ladle into the pan again, and draw the foul ſcum aſide from the part where the froth riſes, or the whole will be ſpoiled: when no more clear froth will riſe, take the pan off, and turn the remainder out into a veſſel of cold water. It may be afterwards further purified

along with other combs, by the ſecond Proceſs. A ſhallow tin ladle will be moſt convenient for this buſineſs; but for want of that a baſting-ladle with the top taken off, will do very well.

821. The pan that has the purified wax is to remain near the fire undiſturbed, and with a cloth over it, until it is cold; it will then turn out a cake of fine wax (if it has been managed judiciouſly) and free from droſs.

822. This Proceſs may be very ſerviceable as preparatory to forming *white* wax; and for ſeveral other nice purpoſes, where great purity is required; and in fact is the readieſt and cheapeſt method of extraction of any; but is reſtricted only to fine combs.

Proceſs the Fourth.

To render WAX *miſcible with Water.*

823. In a quart of water diſſolve one ounce of pearl or pot aſh; add combs as in Proceſs the ſecond, and boil them until melted: the whole will then appear of a milky colour, the wax and water being incorporated, and when cold will reſemble cream. To reſtore the wax re-boil it with three times the weight of aqua-fortis as there was of aſhes; hereby the wax will be extricated from the water, and reſume its uſual ſtate, only of a paler colour than common. I give this Proceſs as one that I happened on in the courſe of my experiments, not knowing but it might convey ſome uſeful *hint*, or prove of real ſervice.

824. Doubtleſs ſome ingenious perſons, who keep conſiderable Apiaries, may add to the above improvements; which are but new to myſelf, and conſequently not likely to be ſo perfect as time and experience may render them.

825. Combs ſhould never be kept long before they are melted, for, though they be covered in a cloſe box, the Wax-Moth will find a place to depoſit its eggs in, and the young maggots will gain an entrance to the deſtruction of the combs; after which, turning to perfect moths, they will prove very hurtful to your Apiary.

826. A hive of combs yields but a ſmall portion of wax, compared with the quantity of honey. A hive of three pecks well filled, and of not more than two years ſtanding, may afford twenty-five pounds of honey, and not above two pounds of wax. Stocks, taken one with another, in the common way of management, do not upon an average afford above one pound of wax each.

CHAPTER XXII.

Characteriſtic and Medical Obſervations on HONEY.

827. IT has been already obſerved, that the perfection of honey ariſes from the ſuperior quality of the flowers from which it is gathered (514) and alſo from the degree

of

of care and cleanlineſs in its ſeparation from the combs. The former is regulated by the ſituation of the Apiary for paſturage, and by the weather; for however plentiful the beſt of honey-flowers may be, if the weather prove too cold, too wet, or too dry, when they are in bloom, they can yield no honey; or what amounts to the ſame, the Bees cannot fly out to procure it; but the weather perhaps proving more favourable afterwards, when the beſt flowers are gone, and a more inferior ſort are blowing, the Bees in this caſe are neceſſitated to collect from them. If a ſurloin of beef cannot be had, we muſt take up with a leg. Hence it is, that in ſome years, no fine honey is produced. And on theſe principles it may be ſuppoſed, that even in the ſame year, different Apiaries may produce honey of very different qualities, though the paſturage be equal, the difference ariſing from the weather being favourable to one ſituation, and not to another.

828. The honey that is generally ſold in the London ſhops, is too haſtily condemned, as being ſophiſticated with flour. To aſcertain this point, I mixed with a ſmall quantity of my fineſt honey, ſome flour, in different proportions; by none of which was it altered to the appearance of London honey. Therefore the difference muſt be aſcribed to the nature of the places from which it is uſually brought; that is to ſay, the heath countries. Theſe indeed produce a great abundance, but, from the nature of the

flowers, the honey is but indifferent (507, 560); to this muſt be added, the groſs method of extracting the honey from the combs by means of a preſs; which ſufficiently accounts for its too common coarſeneſs and foulneſs.

829. To explain this more diſtinctly, it muſt be remarked, that in Stocks which ſtand more than two years, the combs become black, and the cells foul, by the quantity of brood ſucceſſively depoſited in them. Not only ſo, but when a hive is taken up, there is frequently ſome brood or maggots in parts of the combs; as alſo farina, both new and ſtale. The taſte of the maggots is like that of ruſty bacon; and that of the farina, a nauſeous bitter. If any of theſe therefore, through careleſsneſs, be preſſed out along with the natural impurities of the combs, and intimately incorporated with the honey, it is no wonder, that this becomes diſagreeable to the ſight and taſte, and even unwholeſome; nor that in general, it is diſeſteemed and neglected.

830. It is a prevailing opinion among country people, that all *ſwarm honey is virgin.* This proceeds from a ſuppoſition that a Swarm conſiſts intirely of young Bees, and therefore their honey muſt be the beſt. But in neither caſe is this true. A Swarm conſiſts both of old and young, equally with a Stock: but even admitting they were all young Bees, what difference can there be in the ſelection of the flowers between the old and the young? If there be any, however, it muſt be in

favour of the old Bees as more knowing and more ſkilful than the others. The truth is, none are virgin combs that have had brood or farina in the cells, whether it be in a Swarm or Stock. Now a Swarm breeds through the ſummer equally with a Stock, conſequently great part of their combs, eſpecially the central ones, are filled with brood, as well as thoſe of the Stock. So that in both, it is only a part or portion of the combs, that contains true virgin honey; if by *that name* be meant honey of the *greateſt purity*. The grand point therefore is, when the combs are taken, to ſeparate the virgin parts from the other with the greateſt care and niceneſs poſſible.

831. By managing Bees in the ſtory method, the advantage in this reſpect is very great, as whole hives or boxes may be taken filled with *intire virgin* honey and wax: but which is always impracticable by the common hives and management, and in general by the collateral method.

832. It muſt be conſidered, however, that honey may be really virgin, and yet but bad honey in its quality. For, as before noticed, honey as collected by the Bees, in the firſt inſtance, is good, bad, or indifferent, according to the nature of the flowers from which it is gathered. And therefore a purchaſer may be ſupplied with intire virgin honey, and yet be greatly diſappointed. For inſtance, honey gathered from heath, and depoſited in new virgin cells, will be true virgin honey:

but as heath affords only that of a bad quality, the nature of the place where it is lodged cannot improve it.

833. As fine virgin honey is procured in much ſmaller quanties than any other, the price ought moſt certainly to be larger in proportion. Thoſe who will not give a good price muſt expect to have an inferior ſort impoſed upon them inſtead of the beſt. But as few buyers are competent judges they are apt to think the demand exorbitant. If the ſeller be of tried honeſty, and the buyer not avaricious, a confidence may be placed without danger of impoſition.

834. Foreign honey is much extolled as being far ſuperior to any produced in England. This in a great meaſure may be true, but not intirely; the wild thyme and roſemary of Narbonne in France; of Minorca; of Mount Hymettus, in Greece; of Hybla, in Italy, may be injured, while in bloom, by ſhowery weather; and this opportunity being loſt, the reſt of their flowers will yield no better honey than our own country affords. Beſides, as they have ſuch prodigious quantities, it is very probable that the Apiators of thoſe countries are not more cleanly or more careful in the extraction of it from the combs than the farmers dames of our own iſland. Shall old England's peaſantry ſubmit the palm of cleanlineſs to thoſe of France or Spain, or any ſouthern climate whatever?

835. It is poſſible to have as fine honey in England as the foreign, in any and every year,

by having a large garden planted with a great quantity of aromatic flowers. It may farther be remarked, that the foreign honey muſt greatly vary in its quality, in different years, according as the weather has been more or leſs favourable. The different apiaries alſo, as with us, owing to diverſity of ſituation, and of management, cannot be ſuppoſed to produce honey always equally fine. Therefore, let us not be carried away by the "whiſtling of a name", but let our ſenſes of ſmell and taſte come in for a ſhare in the judgment.

836. Honey when expoſed long to the air, grows hard, rough, and ſeedy: to prevent which the Bees ſeal or cover the cells of honey with wax; as in this ſtate it is to them quite indigeſtible. Not that all honey is alike in this reſpect; ſome years afford it of a more liquid nature than others; and difference of ſituations often has the ſame effect. If honey be kept in a warm place, it will ferment, and turn acid.

837. New honey is better than old, as it is continually loſing ſome of its fragrancy, unleſs very cloſely confined by a bladder. That which is collected in the ſpring and ſummer is ſuperior to that of the autumn; the clear than the yellow. That which has a kind of acid ſweet than that which is wholly ſo. The beſt is light coloured, fragrant, and ſomething aromatic, partaking of the nature of the flowers it was gathered from. The colour depends on that of the different juices

which yield it. Thus the honey collected from trees is higher coloured than that from flowers; and that from the bloſſoms of heath, darker coloured than what is gathered from any other flower.

838. For medical purpoſes honey is directed to be clarified. This is performed by ſetting a baſon, containing the honey in a veſſel of hot water, over a clear fire without ſmoke, and taking off the ſcum as it riſes. If the honey be foul, this method will free it from the groſſer impurities, but not from the lighter heterogeneous matters with which it is uſually mixed, ſuch as duſt and farinaceous ſubſtances; nor from the juice of the maggots, with which it oftentimes is blended. Neither has a vapour bath force enough to effect this, nor even a violent boiling of the honey in a naked veſſel. On the contrary, if the honey be really *virgin*, nothing will be thrown upon the ſurface by boiling, except froth; and inſtead of being improved by this management it will be robbed of its moſt eſſential excellence; viz. its aromatic fragrance, and be debaſed to a ſugary flavour.

839. If honey be bought for virgin; it will be eaſy to diſcover whether it be really ſo or not, by clarifying a ſmall portion of it. One exception, however, muſt be made, viz. that ſmall portions of wax, notwithſtanding all the care that can be taken, will paſs through the hair-cloths with the honey in draining. This however generally riſes upon

the ſurface, after the pots have ſtood a few days, and is eaſily taken off.

840. Perhaps the beſt way to purify honey is to incloſe it in a bladder, and put it into hot water, until it be juſt fluid, and then to paſs it through a thick flannel bag of a conical or funnel ſhape. The bladder will confine the volatile parts, and the reſt of the operation being quickly performed, little detriment will be ſuffered. But care muſt be taken that it be not kept in the water until it is ſo warm as to melt the particles of wax that may be intangled in the honey. As honey partakes both of an acid and ſaline nature, the veſſels in which it is kept, ought not to be (as is uſually the caſe) glazed with lead; as is that called Delf, the cream coloured ſtone ware, and all the common earthen ware.

841. It is well known, that acids and ſaline ſubſtances will diſſolve a portion of of lead, if they be any conſiderable time in contact with it. This ſaturnine impregnation often proves highly prejudicial, eſpecially to delicate conſtitutions; while the real cauſe of the complaint is not ſo much as ſuſpected. For this reaſon, honey ſhould always be kept in white or brown ſtone pots or jars: which being glazed with ſalt, are as free from any noxious quality as the porcelain from China.

842. In a medical view, the fineſt honey, concentrates the eſſence of the moſt ſalutary flowers; "*and is the moſt exalted of all*

Balſams whatever"*. But like them it is heating, in what manner ſoever it be taken; whether as food or phyſic. It ſuits chiefly cold and phlegmatic habits; old men; or thoſe who by ſickneſs or other cauſes abound in groſs viſcid humours. But to perſons of a bilious or hectic † conſtitution it generally proves inflammatory.

843. It is uſeful as a detergent ‡ and aperitive,§ powerfully diſſolving the too ſluggiſh juices, and promoting the expectoration of tough phlegm. A continued uſe of it as an article of diet, has been found of ſingular ſervice in the gravel and ſtone.

844. Where honey proves griping or purgative, the boiling of it will moderate theſe effects, by diminiſhing its tendency to fermentation. However ſalutary honey in general may be, yet there is a peculiarity in ſome conſtitutions which renders the leaſt quantity of it highly diſagreeable, occaſioning exceſſive ſickneſs and vomiting, and ſevere griping, nay in ſome perſons, the effects produced by its uſe reſemble thoſe occaſioned by poiſon.‖ A doubt ariſes with reſpect to theſe caſes, whether the noxious quality, might not rather proceed, from ſome heterogeneous particles or impurities, incorporated with the honey, than from *pure* honey itſelf. In this branch of phyſics, as well as in many others,

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* *Dr. Leake's Medical Inſtructions.*

† *Hot or feveriſh.* ‡ *Cleanſing.* § *Opening.*

‖ *This Medical character of honey is taken from authors of the firſt eminence.*

accurate and repeated experiments are wanted in order to aſcertain the truth.

845. If domeſtic wines, were made with honey inſtead of ſugar, they would be more ſimilar to foreign wines: they would be of a more delicate flavour; of a more cordial quality, and ſet lighter upon the ſtomach. Though honey, when made into Mead, or in any other form, has proved diſagreeable to many, yet when made along with fruit, into wine, it has proved to the ſame perſons both agreeable and exhilerating.

To make MEAD, *equal to foreign Wines.*

846. To every gallon of water, put three pounds of the fineſt honey: boil it as long as any impurities riſe; which are to be carefully ſkimmed off. It will ferment of itſelf, but ſome chooſe to haſten it with a little yeaſt, putting therein half of a lemon peel, pared thin. When it is fermented ſufficiently, put it into your veſſel, and the peel with it: leave a ſmall vent, as long as there ſeems any degree of fermentation; then add to it half a pound more of honey for every gallon of liquor; and immediately bung it down cloſe. Let it ſtand ſix months and then bottle it off for uſe. If intended to be kept ſeveral years, three pounds and a half of honey muſt be at firſt put to a gallon of water.

847. As the intention of boiling is only to ſeparate the impurities, and to induce a perfect union of the honey and water. It is ſelf-evident a ſhort boiling will fully anſwer

ſwer every purpoſe. This ſhould be carefully noticed; becauſe the longer the liquor is boiled, the leſs will it be diſpoſed afterwards to ferment kindly; in conſequence of which, inſtead of being of a vinous quality, it will have a diſagreeable luſcious ſweetneſs; and not that fine racy flavour, of which it is capable equal to foreign wine.

848. This intention is alſo fruſtrated by the injudicious though common practice of making the liquor ſo ſtrong of the honey as to bear an egg: this renders it a mere ſtum, and prevents ts undergoing that complete and *regular* fermentation, which is neceſſary to the production of a perfect, uniform vinous liquor.

849. The expreſſed juices of fruits, and all ſugary vegetables, have naturally a ſpontaneous tendency to ferment into a vinous liquor, without the addition of a ferment. Therefore the quantity of yeaſt neceſſary to ſet the liquor to work is but very trifling, and, if done in warm weather, perhaps it will ſucceed beſt without any. If the yeaſt be not perfectly good and free from any ill flavour, it will be impoſſible to produce a perfect and effectual fermentation; and whatever ill flavour the yeaſt is charged with will be communicated to the whole body of the liquor. For which reaſon it is, that the lemon peel is directed not to be put to the liquor, until the fermentation is begun. For then a very ſmall quantity of any flavourable ingredient will communicate its flavour to a

large caſk of liquor; whereas, if put to it before or after the fermentation, it will be imperceptible.

850. It requires a circumſpect attention to mark the progreſs of the fermentation, that it exceed not the limits of the *vinous*, by running into that of the *acetous*. This is a knowledge acquired only by practical obſervation made on the liquor, during its progreſs, and by frequently taſting of it; for as ſoon as it has acquired the vinous flavour the progreſs of the fermentation muſt be ſtopped, or it will ſoon turn to the acetous, and therefore at the vinous point the liquor muſt be tunned up. By this means the heat is leſſened, and the progreſs gradually ſtopped, the heavier particles condenſe and ſubſide, while the lighter, by the frequent filling of the caſk are thrown out at the bung-hole, and leave the liquor compleatly purged of all matter which might hereafter endanger a pernicious fret, or turbidneſs. On the contrary, if the liquor happens to be checked in the working, ſo as not to attain the due degree of fermentation, the motion being loſt, the *fæces* or *dregs* will not ſubſide, nor will the liquor afterwards become fine or lively. While the liquor is fermenting, the veſſel ſhould have ſuch a covering as barely to allow for the eſcape of the air let looſe by the operation.

851. The principles of fermentation are of too extenſive a nature to be inlarged further upon in a work like this; what has been de-

livered will I hope prove of ſome uſe, not only in the making of Mead, but of all domeſtick wines; as alſo in brewing. People in general having a very confuſed and imperfect idea of conducting a proceſs which requires great nicety and ſkill.

CHAPTER XXIII.

How to find BEES *in* Woods, *and to ſecure them in a* HIVE.

852. THE beſt time to look for them is in the ſpring, when the ſallows, and other plants that afford plenty of farina, are in bloom. If many Bees be ſeen collecting from theſe bloſſoms, or frequently viſiting any ſprings or ponds, it indicates that their habitations are not far off; and if no perſons keep any pretty near, it may ſafely be concluded, that they are wild Bees, and not private property.

853. In order to diſcover from whence they come, diſſolve ſome red or yellow oker, or any other colouring ſubſtance, in water, and dipping ſome ſprigs or graſs in this ſolution, ſprinkle the Bees with it as they alight, Wheat flour alſo or any other coloured powder may be ſhook or puffed over them, ſo as to mark them for further examination. For, by obſerving whether their returns be ſooner or later, or whether they aſſemble in greater or ſmaller numbers, the diſtance of their re-

ſidence may be gueſſed with tolerable accuracy. If they return ſoon, it is probable you may trace them home without much trouble: But if not, take the joint of a large reed, or of elder, force a part of the pith out at one end, put a little honey, or ale and ſugar, into it, and ſtop that end with a cork or paper; then cut a ſmall ſlit over where the honey lies, that the ſmell of it may attract the Bees. The pith of the other end is alſo to be taken out, ſo as to leave a ſmall partition between the two hollows; this end is to be left open. Place this joint near their haunts, and they will ſoon be allured to enter into the hollow: when about half a dozen are in ſtop the open end with your finger. Soon afterwards let one of the Bees out, purſue it as long as it is in ſight, then letting another fly, if it continues the ſame courſe follow that alſo: but if any of them take a different route, let another fly, and ſo proceed until you find ſeveral take the ſame courſe, and thereby lead you to their abode.

854. If this ſhould happen to be in a hollow tree, &c. (324) and it is deſireable to diſlodge them, it may be done, as directed (298). Fumigation will oblige them to quit their habitation and treaſure. At firſt iſſuing out they will be in a great rage, therefore the operator, as well as the bye-ſtanders, muſt be upon their guard, or they will ſmart for it. The ſmoaking a ſhort pipe of tobacco will keep them from the face, or any thing held in the hand that emits a great ſmoke, will keep them at a proper diſtance. If they are taken early

enough in the honey ſeaſon to repleniſh a hive, it will only be neceſſary to place therein ſuch combs, or part of combs, as have brood in them, faſtening them in with ſpleets in the beſt manner you can.

855. But if done too late in the ſeaſon for the Bees to furniſh a new habitation with a ſufficiency of winter ſtore, the combs muſt be taken out of the tree, as whole as poſſible, and placed in an empty hive in the moſt judicious manner, and ſimilar to what the Bees themſelves do. Then putting in the Bees, they will ſoon ſecure and repair them to the greateſt advantage.

856. Great care however muſt be taken that the Queen be not killed in the operation. When this happens it may be known by the Bees not working out the next day as others do. In ſuch a caſe a ſpare Queen or royal cell muſt be given them, or they muſt be united to another Stock; taking the honey yourſelf in reward for your trouble.

At the latter end of a ſummer, and when it is not intended to preſerve the Bees, but only to take the honey, the proceſs may be ſhortened; for by only making a ſufficient opening in the tree, then drumming and making a great noiſe about it, to terrify the Bees, (having on the ſafe-guard 73) you may take out the combs ſeverally, bruſh the Bees off, and lay the combs in a proper veſſel. In all theſe operations it is neceſſary that the perſon who operates ſhould be well defended.

857. If a hive, the inſide of which has been rubbed with ſugar and ale, or rather a

hive with ſome empty combs in it, be ſet, during the ſwarming ſeaſon, where wild Bees reſort, it will probably intice a Swarm to ſettle therein.

858. Thus have I faithfully finiſhed, to the beſt of my abilities, the account of the moſt eligible methods of conducting the various operations relating to theſe wonderful inſects. Wonderful in their nature, properties, and ſuper-eminently uſeful above all others; affording not only food and medicine, but alſo a very valuable article to the mechanic and manufacturer; and ſupplying the abſence of the ſolar light by the ſplendor and elegance of its illuminations in the habitations of the noble and the opulent. The ſilk-worm indeed may in ſome meaſure vie with the Bees, as adorning by its labour the perſons and habitations of the beautiful, the wealthy, and the great. But with reſpect to the other tribes, our inſects are unrivalled in all.

859. Therefore, while we contemplate the *Divine Wiſdom* in a diſplay ſo wonderful and beneficial, let us not forget the *moral* inſtruction naturally deducible from it: for with the greateſt propriety, may be inſcribed on every Apiary, *Behold the School of Sobriety, Induſtry, and Oeconomy!*

FINIS.

THE

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Note. *The Figures refer to the Paragraphs, not to the Pages.*

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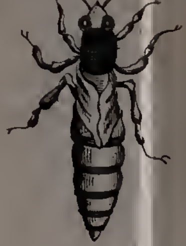
Fig. 1 Page. 3

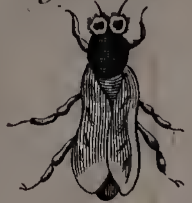
Fig. 2 P. 16

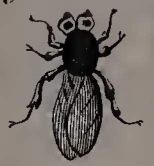
Fig. 3 P. 16

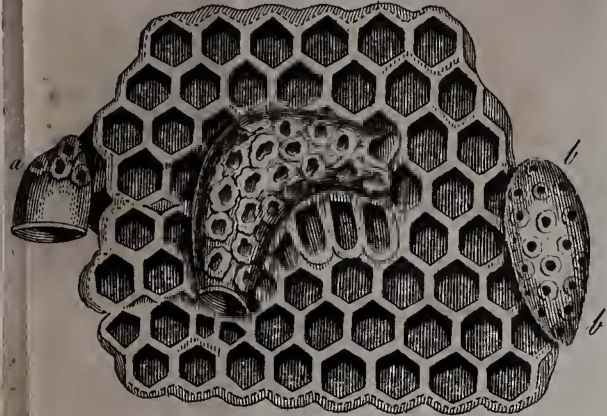
Fig. 4 P. 13

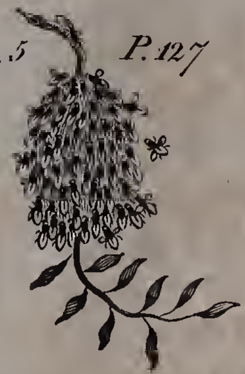
Fig. 5 P. 127

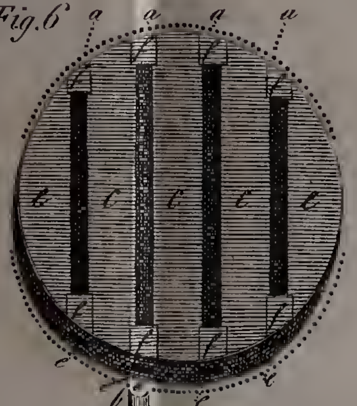
Fig. 6 P. 60

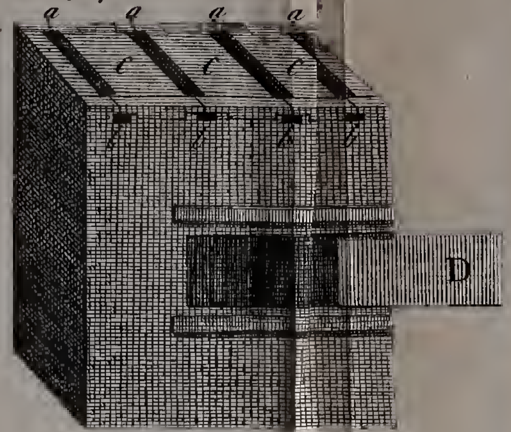
Fig. 7 P. 46

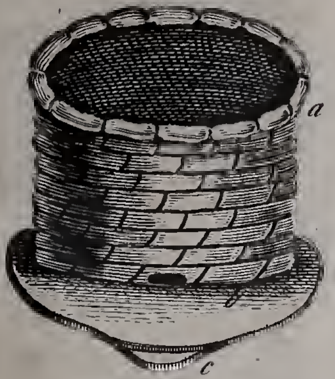
Fig. 8 P. 39

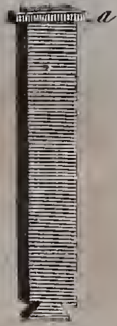
Fig. 9 P. 47

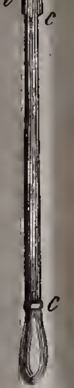
Fig. 10 P. 54

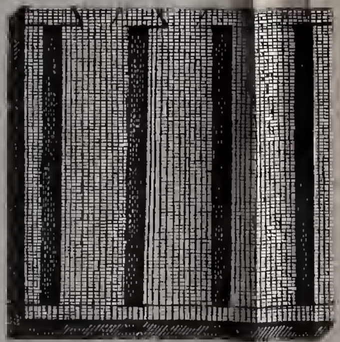
Fig. 11 P.5

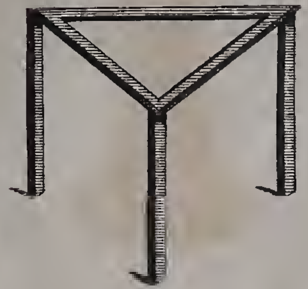
Fig. 12 P. 37

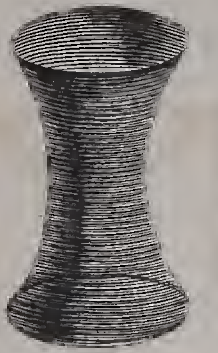
Fig. 13 P. 191

Advertiſement.

⁂ GENTLEMEN who do not reſide too far from London, may be furniſhed by the Author with a pair of Straw Hives, or of Boxes and Sliders, of his conſtruction, at the prices fixed in page 86, as models for others to be made by: for the inferior workmen, eſpecially in country places, are often deficient in making them of the requiſite exactneſs without a pattern.

The Hives or Boxes, together with all contingent expences, to be paid for on delivery, at the *Four Swans Inn, Biſhopſgate Street.*

N. B. Eight or ten days previous notice is requeſted.

ERRATA.

PAGE 30, l. 9, for 384 read 316, 320; p. 38, l. 6, for 490 read 480, 481; p. 39, l. 7, for *of* read *or*; l. 8, for *fig.* 6 read *fig.* 8, *b*; laſt l. after *fig.* 8 add *c*; p. 47, l. 17, for *eleven ſquare* read *eleven and a half ſquare*; l. 20, after *fig.* 7 add *c*, *c*, *c*; p. 48, l. 5, for *braided* read *bradded*; p. 49, l. 3, leave out *After and the three following lines*; p. 60, l. 17, for *and* read *at*; l. 4 from the bot. after *diſunion* add *until the glue is perfectly dry*; p. 62, l. 12, after *to be* read *partially ſtopped up, leaving a free paſſage to the grooves, otherwiſe*, &c. p. 64, for ſection 187 read 157; p. 65, l. 7, for *Goddy* read *Geddy*; p. 81, l. 13, for 193 read 195; l. 20, for 190 read 165; laſt l. for 605 read 611; p. 87, for 260 read 266; p. 105, l. 3, for 249 read 282; p. 111, l. 6 from the bottom, for *Stock* read *Swarm*; p. 120, for 384 read 320; p. 146, l. 8, for 733 read 736; p. 168, l. 10, for *riſing* read *reſting*; l. 3 from the bottom, for *in ſliders* read *ſliders in*; p. 169, l. 12, for *burt* read *bunt*; p. 183, l. 10 from the bottom, for *on* read *no*; p. 192, laſt l. for *glaſſes* read *board*; p. 197, for *is adapted* read *was intended*; p. 219, l. 9, after *Sallows* add a *; l. 10 from the bottom, for *Garden Fennel* read *Garden Teazel*; p. 221, l. 3 from the bottom, after *ſprouts* read *if permitted to flower*; p. 244, l. 5, for 830 read 530; p. 229, l. 5, for *a quarter of* read *half*; p. 263, l. 19, after *not* add *that*; p. 361, l. 7 from the bottom, for 222 read 239; p. 362, l. 4 from the bottom, for 645 read 745.

Poſtſcript.

AS Perfection is attained by ſlow degrees in all arts and ſciences, I am happy in communicating to my readers an improvement I made ſince the former part of this work went to the preſs, which is that of a more ſimple conſtruction of the ends of the Box Bars than is mentioned in paragraph 112, pages 47, 48.

¶ 112. There muſt be parallel grooves in the edges of every bar, and in the two ſides of the box: theſe grooves muſt be one-ſixteenth of an inch deep, and one-twelfth of an inch wide, into which *iron ſliders* are propoſed to run; to admit which, in the back of the box, the ends of the two outward bars are to be one inch and ſeven-eighths wide, and the middle bar two inches and three-eighths, ſo far as they reſt upon the *edge* of the box. The *back* edge of the box is to riſe between the bars, that it may be even with the grooves, and the upper vacancies are to be filled up with *four* ſmall bridges, having openings three-fourths of an inch long and one-eighth deep, to permit the four ſliders (fig. 10.) to run under them into the grooves, as at fig. 7, *b. b. b. b.* Theſe bridges are to be neatly and ſecurely bradded on the edges of the box.

I HAVE alſo found that the joining *End Pieces* of the Straw Hive Tops, mentioned in paragraph 146, will ſtand the *heat* better, and are more eaſily worked, if they are DOWELLED in (a technical term among carpenters) rather than glued; which are apt to give way and become looſe as the wood ſhrinks. The pieces in this caſe are to be only half an inch wide.